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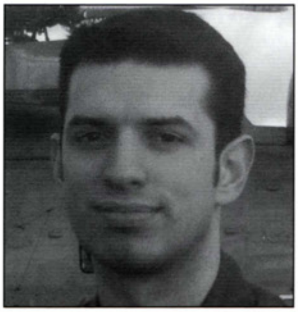
The British Fleet Air Arm in World War II

Mark Barber • Illustrated by S Walsh and M Postlethwaite



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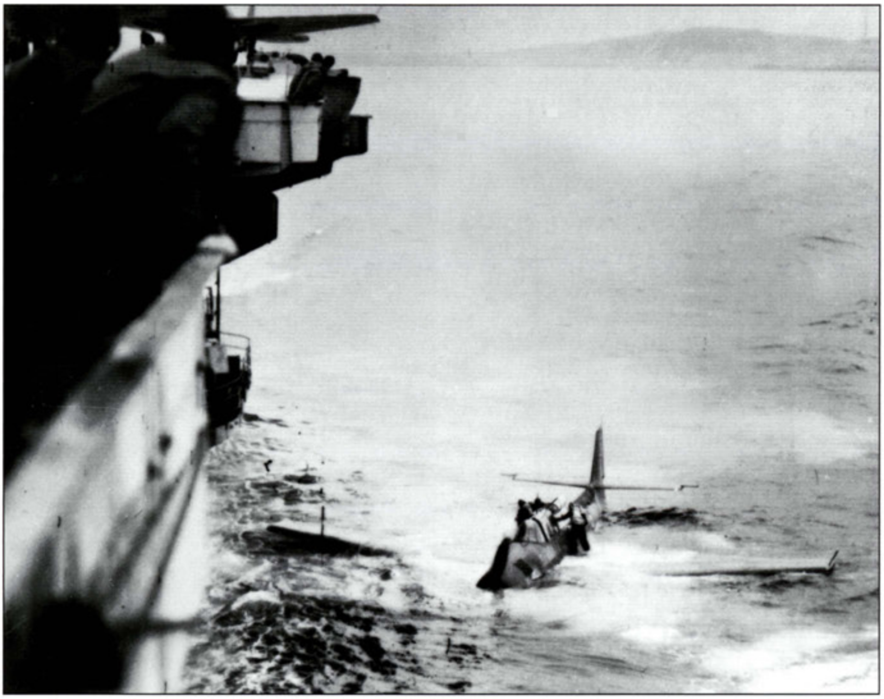

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To avoid confusion, in this text the names of Royal Navy warships are italicized – e.g. HMS *Ark Royal* – and those of shore stations are printed in Roman type – e.g. HMS Collingwood.

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THE BRITISH FLEET AIR ARM IN WORLD WAR II

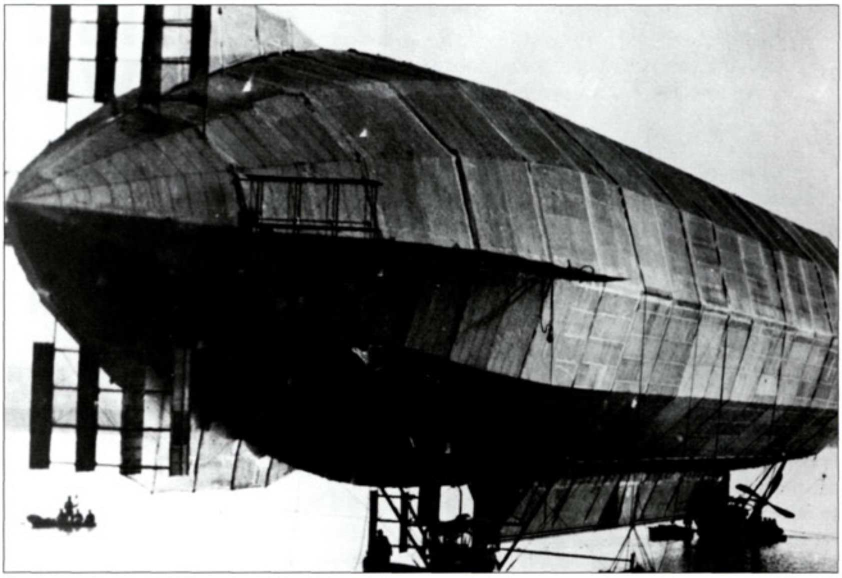
ORIGINS OF THE AIR BRANCH

It was in 1903 – the same year that the Wright brothers pioneered powered flight in a heavier-than-air craft – that the Royal Navy first showed an interest in aviation. The American Samuel F. Cody approached the Admiralty with his designs for a ship-mounted kite which could be used for reconnaissance, signalling and direction of naval gunfire. Within five weeks, demonstrations began to show the potential of ship-mounted kites; a single aircrewman could be lifted to a height of 600 feet with a radio aerial, greatly improving the range of communications. The Admiralty was impressed by the results from the trials; but Cody asked for extortionate sums of money for his designs, so the Royal Navy purchased its first kites from another designer. Simultaneously, a naval committee was set up to investigate the possibility of using balloons for a similar purpose. While advances were being made in the field of conventional heavier-than-air machines, the Admiralty felt that the future of an air arm for the Royal Navy lay with balloons and airships, which had a superior endurance and load-carrying capacity.

It was for this reason that the Admiralty turned down an offer of patents from the Wright brothers in 1907. Only a year later, however, the Wrights had developed an aeroplane with a range of over 50 miles; and in November 1908, Cdr Dunne became the first RN officer to fly a heavier-than-air aircraft. Two years later Lt G.C. Colmore became the Royal Navy's first qualified pilot – although he had had to fund his own training – and the Admiralty began to show an interest. In 1911 the British military boasted only six qualified pilots; but the RN had trialed its first seaplanes by the end of that year, and in January 1912 Lt C.R. Samson flew a Short S27 biplane from a platform on the bows of the battleship HMS *Africa*. Samson was appointed OC Naval Wing of the Army's Royal Flying Corps in October that year.

Both the Netheravon flying school and the Royal Aero Club offered to teach naval officers to fly, and out of 200 volunteers three Royal Navy and two Royal Marine officers were

LtCdr(A) Eugene Esmonde initially learnt to fly with the RAF, transferring to the Fleet Air Arm when it was still under RAF control. After leaving the RAF he flew as an airline pilot for Imperial Airways, before being approached by the Admiralty to rejoin the Air Branch. He received a Distinguished Service Order for leading the Swordfish of 825 NAS against the *Bismarck* in May 1941, and a posthumous Victoria Cross for his gallant leadership during the German 'Channel Dash' of February 1942 (see Plate D).



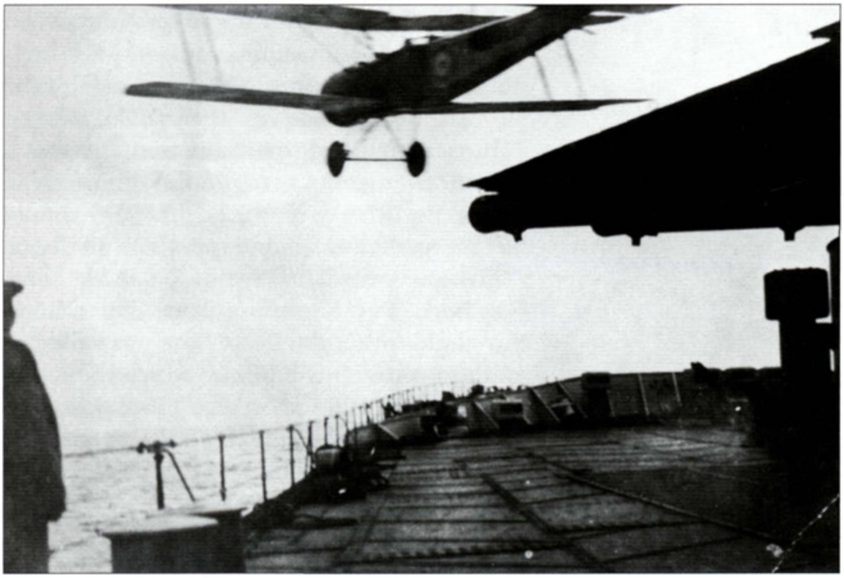
The Admiralty's first real interest in aircraft lay with balloons and airships. Here, HM Naval Airship No.1 (Rigid), constructed by Vickers, is operating from Cavendish Dock, Barrow-in-Furness. Known as 'The Mayfly', this airship was powered by two 180bhp engines and had an endurance of some 12½ hours, carrying a crew of 26.

selected to become the RN's first Admiralty-funded pilots. In May 1913 the seaplane carrier HMS *Hermes* became the parent ship of the Naval Wing of the RFC; it operated the Short S64 Folder, the first aircraft ever to be designed with folding wings for stowage at sea. On 1 July 1914 the Royal Naval Air Service was formed, giving the Admiralty full control over its own air arm. In September 1914, *Hermes* was joined by HMS *Ark Royal*, a merchant ship converted into a seaplane carrier capable of embarking ten aircraft.

World War I

With the outbreak of war in Europe in August 1914 both seaplane carriers were immediately put into service; however, they were of only limited value, since they were only able to operate aircraft in calm waters and were limited to maximum speeds of some ten knots. Just two months after the outbreak of hostilities *Hermes* was torpedoed and sunk off Calais. However, the RNAS was soon to prove itself capable of much more than reconnaissance and communications. On Christmas Day 1914 seven seaplanes were launched from the decks of the carriers *Engadine, Riviera* and *Empress* to bomb the German airship hangars at Cuxhaven. Further advances were made when Short S184 seaplanes were modified to carry 14in torpedoes; on 12 August 1915, Flt Cdr C.H.K. Edmonds became the first man in history to sink a vessel under way at sea by an air-launched weapon, when his torpedo sank a 5,000-tonne Turkish merchant ship in the Gulf of Xeros.

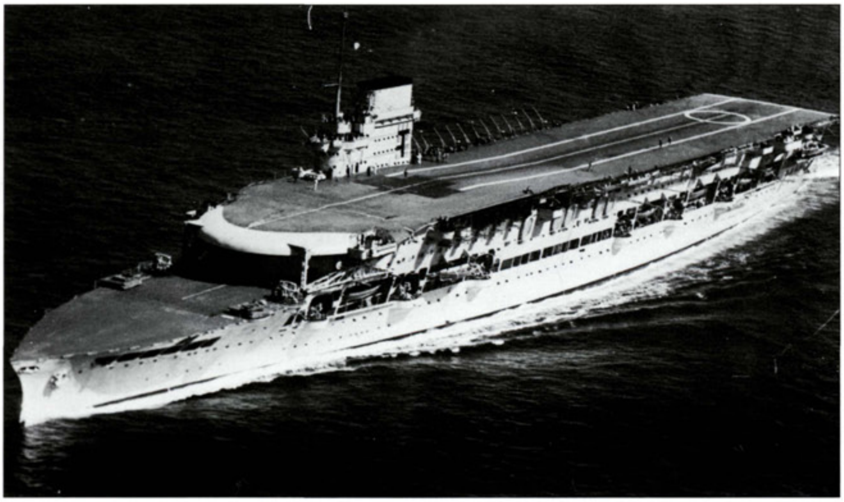
The RNAS was not confined to the tasks which it had originally been formed to carry out; with the development of the 'scout' or fighter aircraft, many naval squadrons became involved in the growing air war along the Western Front, and in defending Britain itself from enemy aircraft, after the RFC directly asked for assistance. On the night of 6/7 June 1915, Flt S/Lt R.A.J. Warneford became the first naval pilot, and only the second airman, to be awarded the Victoria Cross when he became the first pilot to bring down a Zeppelin; he had diverted himself away from a bombing mission in order to use his



A Sopwith 1½ Strutter is launched from a platform secured to the forward 15in gun turret of HMS *Glorious*. Originally constructed as a large light cruiser, *Glorious* was converted for use as an aircraft carrier following the Washington Naval Treaty of 1922.

bombs air-to-air against the German Army airship LZ37 (Olt Otto von de Haegen). Another notable naval pilot was the Canadian LtCdr Raymond Collishaw, DSO*, DFC, DSC, who ended the Great War as the leading RNAS (and the British air forces' third-ranking) surviving ace, with an official tally of 60 aerial victories.

While RNAS pilots were proving their skills alongside their brothers-in-arms in khaki, many of the service's greatest achievements were in the specific field of maritime aviation. As well as pioneering both the airborne torpedo and depth-charge attack, the RNAS landed the first aircraft on the deck of a vessel while it was under way, when SqnCdr E.H. Dunning sideslipped a Sopwith Pup on to the converted forecastle of the battlecruiser HMS *Furious* on 2 August 1917 (unfortunately, he was killed five days later while attempting to repeat the feat). But however great the contribution made by the RNAS to both the war effort and to pioneering the techniques of naval aviation, the service was not to survive even until the Armistice.



HMS *Glorious*, now fully converted to her new role; the conversion began in 1924 but she was not recommissioned until 1930. *Glorious* was fitted with a main flight deck and a smaller, 'flying off' deck on the bow, although this latter was fitted with anti-aircraft guns during a 1935 refit.

The Gloster Sea Gladiator was basically a Gladiator Mk II with the addition of an arrestor hook, dinghy stowage and catapult points. Only 98 were built or converted for the Fleet Air Arm, and of these a total of 54 were in service by September 1939.

The British government commissioned the South African statesman Gen J.C. Smuts to investigate the most efficient usage of the air assets available to the armed forces. Smuts concluded that, since there was a significant overlap between the duties of the RNAS and the Army's RFC, the two should be merged into an independent air force. Thus, on 1 April 1918, the Royal Air Force was born. The important place that aviation now held within the Royal Navy was strikingly demonstrated by the size to which the RNAS had grown in just four years: no fewer than 55,000 personnel and 2,500 aircraft were transferred to the fledgling RAF when the RNAS was dissolved.

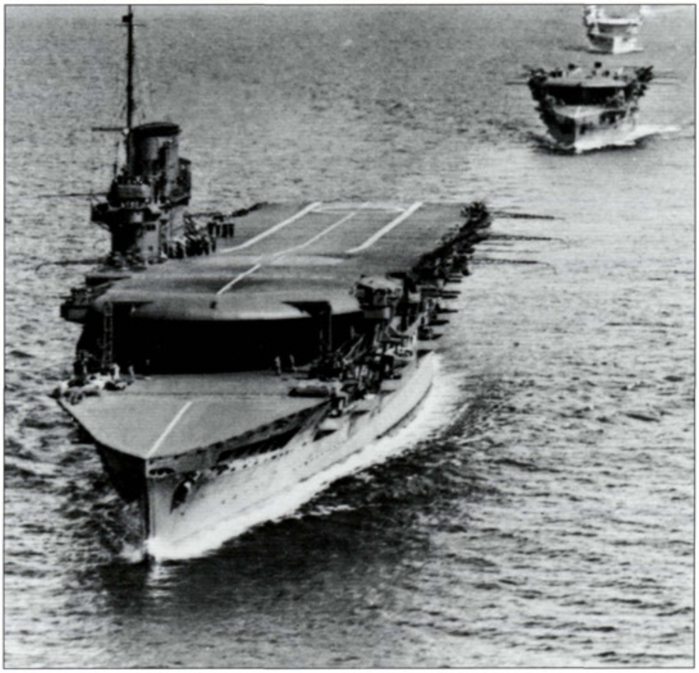
The interwar years

At the Armistice in November 1918, Britain had the largest air force in the world, with 22,647 aeroplanes and just under 291,000 personnel of all ranks; but immediately following the end of hostilities, the RAF was reduced to a mere 12 squadrons. Facing difficulty in finding a role in peacetime to justify its very existence, the RAF concentrated mainly on bombers and the support of ground forces; as a result, Britain's leading place in naval aviation was completely lost. The RAF simply had no interest in maritime aviation, and only reluctantly took on this role. Naval aircrews and ground crews were still very much a part of the RAF, though now going to sea wearing RAF rank and uniform. Some Royal Navy officers – particularly observers after 1921 – were still trained by the RAF as aircrew, the majority of them operating seaplanes from battleships, although some still flew alongside RAF aircrews aboard carriers.

In 1923 the Balfour Committee was established to investigate this problem, and on 1 April 1924 a Fleet Air Arm of the Royal Air Force was officially formed with five squadrons of aircraft. While the Air Ministry still retained administrative control of the FAA, the Royal Navy and Royal Marines now provided 70 per cent of its pilots and all observers and telegraphist air gunners; however, naval pilots were now required to hold commissions in both the RN and RAF, since officially only RAF officers were allowed to qualify as pilots… For the naval officer flying was seen as a somewhat career-limiting choice, as promotion prospects were less favourable than within the executive branch.

While the RAF had greatly hampered progress in the field of specifically maritime aircraft, the few aviation-conscious minds within the Admiralty had at least done their best to advance the idea of the aircraft carrier. By the time of the birth of the Fleet Air Arm the Royal Navy had converted four ships into aircraft carriers; HMS *Argus*, completed in 1918, was the first flush-decked carrier; HMS *Eagle* and *Hermes* sported the first starboard-mounted island superstructures; and the British developed the 'round down' at the rear of the flight deck, to reduce turbulence on finals to land.

Naval aviation spent the majority of the interwar period in the hands of the RAF. The 1920s and early 1930s were a time of limited growth in military aviation across the board, but perhaps nowhere more so than in the FAA; even so, British carriers were the first to develop damage control measures such as hangar sprays and fire curtains. By the mid 1930s, when RAF Fighter Command was readying itself for delivery of its first modern, eight-gun Spitfire and Hurricane monoplane fighters, the FAA was still operating only biplanes with fixed undercarriages. The conservative and parsimonious Air Ministry believed that the Royal Navy could be protected from enemy land-based bombers by the RAF's land-based fighters, thus convincing the Admiralty that the only target for a naval fighter would be an enemy spotter aircraft.



Sister-ship of *Glorious*, HMS *Courageous* had a similar inception, also being converted from a cruiser following the Washington Naval Treaty. Following her in this view is HMS *Furious*, famous for being the first ship ever to land an aircraft successfully, in 1917. Due to her lack of a superstructure she was given the ignoble nickname of 'The Iron'.

With war in Europe looming the bickering between the RAF and RN over control of maritime aviation only increased. Sir Thomas Inskip, the Minister for Coordination of Defence, issued a report to the government in July 1937 in which he recommended that naval aviation be handed back to the Royal Navy in full. However, it was not until 24 May 1939 that the Fleet Air Arm was officially disbanded, and replaced with the Air Branch of the Royal Navy (although readers should bear in mind that the Fleet Air Arm title was retained unofficially by RN personnel throughout World War II, and the two terms will therefore be used interchangeably throughout this text).

A 500lb bomb is loaded on to a Blackburn Skua of 800 NAS, aboard HMS *Ark Royal*. An RAF flight sergeant looks on – evidence of the large number of 'Junior Service' personnel still serving on Fleet Air Arm squadrons in the days after the 1937 Inskip Report.

Compared with the service that the Royal Navy had bequeathed to the new Royal Air Force in 1918, what it got back in 1939 was a fraction of the size and equipped almost completely with obsolete aircraft. An interesting comparison can be drawn with the United States Navy, which retained control of its own aviation assets throughout the interwar period. The US Navy was, by 1939, the world leader in naval aviation, with a large and modern force of aircraft carriers and embarked aircraft which, in some cases, outperformed their land-based contemporaries. In Britain, Air Branch entered World War II with just 232 outdated aircraft and 360 pilots, and a few air stations; Royal Naval Air Station (RNAS) Yeovilton in Somerset was still under construction at the outbreak of the war. Of the Royal Navy's total force of seven aircraft carriers, four were due to be paid off. Assistance was provided by the RAF in terms of loaned ground crews and training for new Air Branch personnel, but years of neglect and misuse at the hands of the RAF meant that Air Branch entered the war in a lamentable state of readiness for modern operations.

RECRUITMENT & TRAINING

At the outbreak of the war a large number of the officers and men of the FAA had transferred directly across from the RAF following the Inskip Report. Even so the service remained significantly undermanned, and 1,500 aircraft mechanics had to be 'borrowed' from the RAF.

The normal route for regular RN officers was through the Britannia Royal Naval College, Dartmouth (BRNC). This entailed joining the Navy as a cadet, either at the age of 13 or straight from school at 18; this intake formed the bulk of pre-war officers, but contributed only a limited percentage during the course of the war. There was no officer aircrew option as such for men joining the interwar Navy; however, seamen officers had the option to transfer branches, to pilot battleship-launched flying boats or to the observer branch, both of which were trained by the RAF.

Similarly, rating air mechanics were trade-trained by the RAF, following basic training at either HMS Collingwood in Fareham or HMS

The North American Harvard was used as an advanced trainer for *ab-initio* fighter pilots. This example flew from Kingston, Ontario, where many wartime RNVR pilots were trained.

One of the most difficult phases of flying training for any naval pilot was learning the art of carrier deck landings. If the approach was misjudged, the aircraft could miss the arrestor wires, after which it would (hopefully) be stopped by a barrier to prevent the aircraft, now with its engine idling, from falling off the end of the flight deck – there was not enough deck space to accelerate and take off again.

Royal Arthur in Skegness, and specialist training at HMS Gosling near Warrington. The air mechanic branch was separated into two tiers: 'artificers' were the more highly skilled, and underwent a longer period of training than the more numerous 'naval air mechanics'. Before the outbreak of war, telegraphist air gunners (TAGs) were exclusively volunteers from other branches within the RN; joining the Navy as a TAG from the outset was not a recognized route, and during the interwar years TAG training was also carried out by the RAF.

Pilot training

On the eve of war the Admiralty recognized that the existing training 'pipeline' for both air and ground crews was insufficient to man the growing ranks of Air Branch. Several measures were put in place to increase the number of aircrew, including some schemes designed to bring much-needed aviation experience into the ranks of the Fleet Air Arm. For example, Eugene Esmonde, an ex-RAF Fleet Air Arm officer and experienced airline pilot, was approached directly by the Admiralty in January 1939, with the offer of a commission into the regular RN as a lieutenant commander in charge of 754 Naval Air Squadron (NAS); he was one of several former RAF and airline pilots brought in by this fast track to bolster the levels of experience. These pilots were among the first true 'Air Branch' officers, wearing a gold 'A' inside the 'executive curl' of their sleeve rank insignia, to differentiate them from Dartmouth-trained officers who were experienced in seamanship.

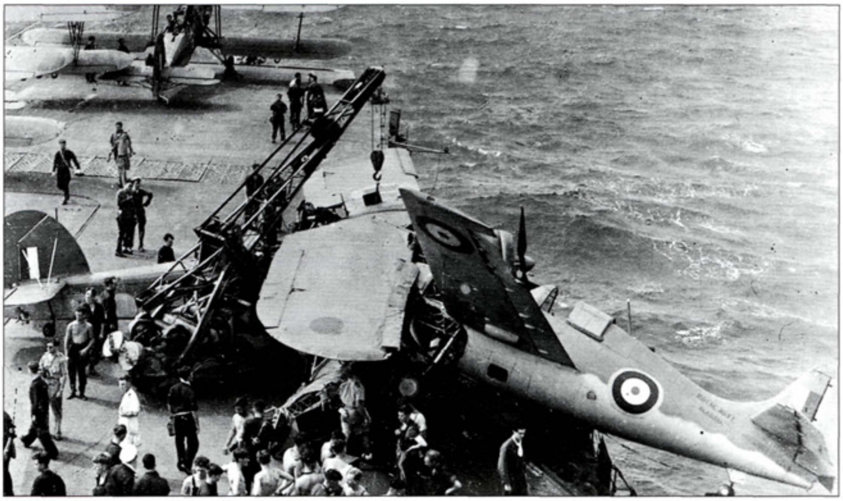
In the months leading up to the war the Royal Navy also attempted to encourage the recruitment of young school leavers by the introduction of Short Service Commissions; it was by this route that the future naval fighter ace R.J. 'Dickie' Cork joined Air Branch. After passing an aircrew medical and the Admiralty Interview Board, successful applicants underwent initial officer training at Greenwich Naval College. After they passed out of Greenwich as sub-lieutenants, the *ab-initio* pilots were then sent to Gravesend for elementary flying training (EFT) on the De Havilland Tiger Moth biplane (the Miles

Magister monoplane was also used as an elementary trainer). Student pilots who made the grade would typically fly their first solo after five to ten hours of dual instruction. The EFT syllabus included the basics: climbing, descending and level turns, which led into circuit flying, before moving on to instrument flying – the techniques required to pilot an aircraft in cloud. Other aspects covered on this initial course included stall and spin recoveries, navigation, formation flying and some basic aerobatics.

Following perhaps 60 hours on the Tiger Moth, naval pilots would graduate to the Service Flying Training School at RAF Netheravon. It was at this stage that pilots were streamed depending on their ability, being separated into prospective fighter pilots and torpedo spotter reconnaissance (TSR) pilots. Fighter pilots would move on to the more powerful Miles Master or North American Harvard trainers, to bridge the gap towards the more demanding combat aircraft. Toward the end of their course they would also fly the Fairey Battle, an aircraft still in front-line service with the RAF as a light bomber – an apparently odd choice, explained by current Admiralty doctrine (see below, 'The Mediterranean: Force H'). Those selected as TSR pilots would fly the Hawker Hart biplane.

The first part of the Netheravon course was basically re-flying all the lessons practised during EFT, but now on a more demanding and less forgiving aircraft. Dive-bombing and night-flying techniques were also added to the syllabus. Night-flying consolidated some of the instrument-flying techniques, which had been reinforced on the ground via a 'link trainer', the primitive forerunner to today's sophisticated simulators. Dive-bombing was practised against wooden floats at sea. On completion of the course, students finally received their coveted 'wings' – the pilot's flying badge.

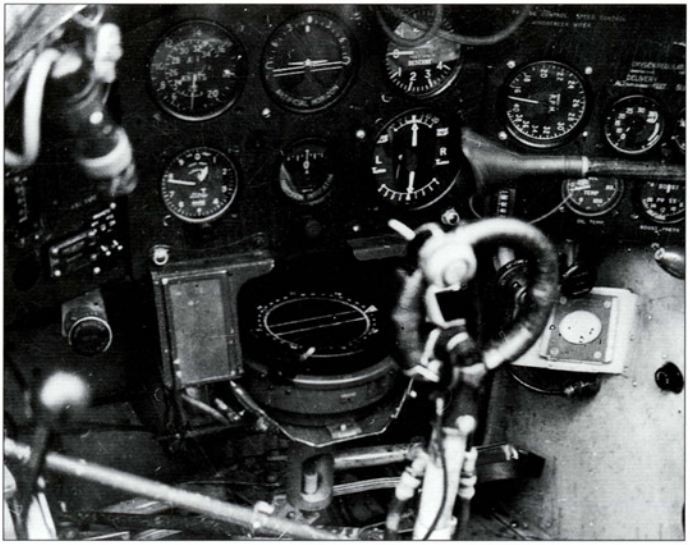
Up to this point *ab-initio* pilots had been trained by the RAF; following successful completion of the SFTS at Netheravon, they returned to the Royal Navy for the last stage of instruction. Based at HMS Raven, near Southampton, pilots converted on to their frontline aircraft type and learnt the difficult art of deck landings. For fighter pilots, exercises included formation flying in cloud, interception,



Even following the successful completion of training, deck landing accidents were far from rare. Here, in the Bay of Bengal in 1942, a Swordfish of 810 NAS has caught its wing on the island of HMS *Illustrious* and swung around to crash into a Martlet of 882 NAS.

gun-camera attacks, oxygen climbs to high altitude, and dog-fighting. Torpedo spotter reconnaissance pilots trained in flying formation at wavetop height, torpedo and bomb attacks, and long-distance navigation under the guidance of the aircraft's observer.

While this system did a great deal to swell the ranks of naval aircrew, it would still not keep abreast of the attrition rate inherent in fighting a full-scale war. The Royal Naval Volunteer Reserve was a hostilities-only system intended for the recruitment of officers with no prior sea experience; the Royal Naval Reserve was intended for officers and ratings with a background in the merchant navy or other similar occupations. Once the war had begun in earnest, over 90 per cent of all naval pilots joined through the RNVR.



The pilot's cockpit of a Fairey Fulmar. The main instruments are arranged so as to be conveniently placed for a pilot's visual scan while flying blind in cloud. The primary instrument is the artificial horizon (centre, top), with the air speed indicator to its left and rate-of-climb indicator to the right. The direction indicator is below the artificial horizon, with a barometric altimeter to its left. The compass is ahead of the control column, which has the firing button for the eight wing guns at top left of the circular grip.

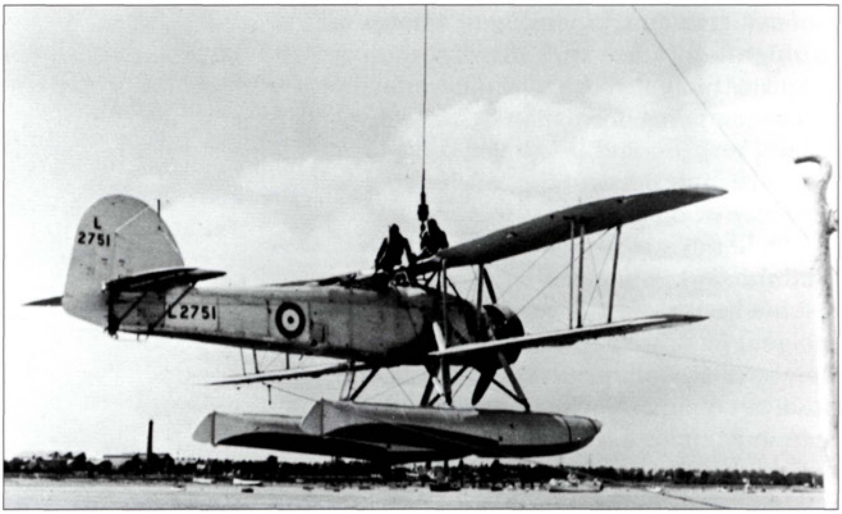
The RNVR system of pilot training was notably different in that *ab-initio* pilots joined up as ratings, wearing a white cap tally to signify that they were, in effect, officers under training. Instruction commenced with seven weeks of general naval training at HMS St Vincent, Gosport, the would-be pilots being rated as naval airmen 2nd class. Graduation from St Vincent brought promotion to the rate of leading airman, before commencing EFT. As well as the UK-based EFT schools at Luton and Elmdon, some *ab-initio* pilots would be shipped to the United States to be trained by the US Navy at Pensacola on the N3N Canary, before graduating on to the Vought Kingfisher for advanced training, and then the Harvard, as used by UK-based courses.

A notable feature of the RNVR system was the large number of aircrew officers recruited into the FAA from New Zealand; the Royal Navy had a recruiting office there, so those who wished to fly could join the RNZNVR without having to travel all the way to Britain to enlist. The contribution made by the men and women of New Zealand was so great that by 1944 there were a number of squadrons manned entirely by personnel from that country, and by 1945 the extraordinary figure of one-quarter of all FAA aircrew were New Zealanders.

Observer training

The role of the observer saw significant changes throughout the war. In 1939 pilots and TAGs were part of a squadron, whereas observers were part of a ship's company; hence, when the squadron disembarked for a period ashore, the observers would be left on board to fly with the next squadron to embark. This oddity stemmed from the fact that observers were always RN, whereas pilots during the interwar period were predominantly RAF officers serving at sea. This mentality even extended to the fact that observers were not given any sort of flying badge or 'wings' for display on their uniform until well after the outbreak of war.

For regular RN observers, as with pilots, training began at BRNC Dartmouth before 'transferring branch' across to become an observer.



This TAG assists in the lowering of a float-equipped Swordfish from the battleship HMS *Barham* in 1938.

Once greater numbers of observers were required the majority were recruited through the RNVR, and therefore carried out the initial seven weeks of their training at HMS St Vincent as naval airmen 2nd class. Initial training at St Vincent segregated *ab-initios* into alternate courses made up of pilots and observers respectively. Following promotion to leading naval airman, trainee observers were then sent to Whale Island, Portsmouth, for gunnery tuition, before moving on to wireless and visual signalling. Training in the air began at either Lee-on-Solent or Ford, and later RNAS Yeovilton and RNAS Arbroath, with *ab-initio* observers training on Blackburn Sharks and Percival Proctors. As with all RNVR officers, those recruited under the age of 20 were ranked as temporary midshipmen on completion of their initial flying training, whereas older recruits were temporary acting sub-lieutenants, or temporary sub-lieutenants if over the age of 21. In 1941 some elements of observer training were moved as far away from the UK as Trinidad. Navigation formed a large part of the early syllabus, as did tactics and fleet strategy, since it was thought imperative that the observer have a sound awareness of where his squadron fitted into the overall tactical picture of the battle. This was coupled with exercises in dead reckoning, spotting fall of shot, and recognition of friendly and enemy vessels.

The end of this first stage of flying training was immediately followed by short courses in reconnaissance photography and air gunnery at St Merryn, before attendance at Greenwich Naval College for a two-week 'spoon and fork' course (so named because the course covered, among other things, the niceties of wardroom behaviour required of a naval officer). Observers were commissioned at the end of their time at Greenwich; they then moved to operational conversion squadrons to acquaint themselves with their individual aircraft type, before being added to the trained strength of front-line squadrons.

TAG training

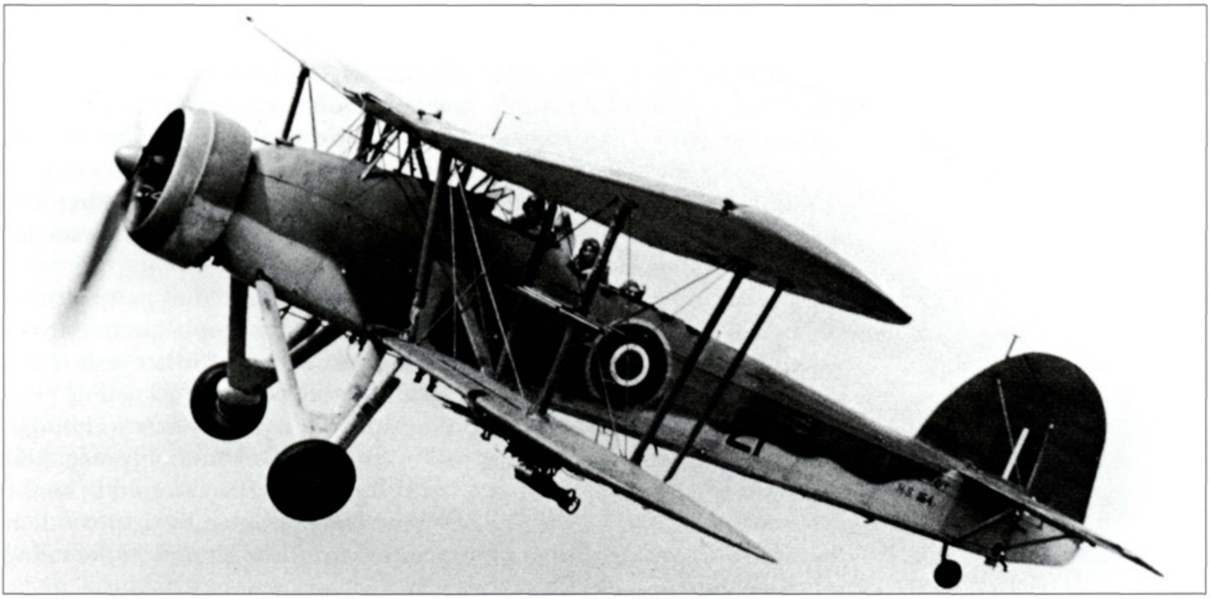
Pre-war telegraphist air gunners were transferred from other branches of the Royal Navy, initially from the Telegraphist branch; later, an Admiralty Flag Order called for volunteers from other branches. A small number of TAGs also transferred across from the RAF following the

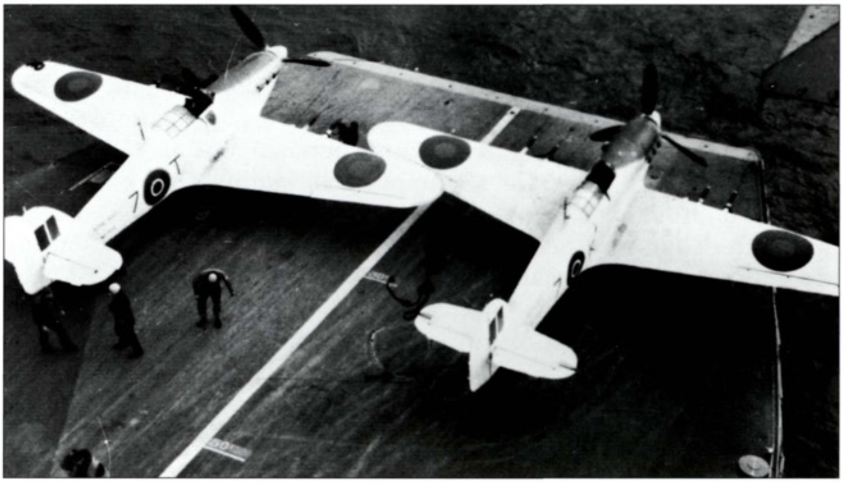
Inskip Report. Technical training was carried out at Portsmouth Barracks before commencing flying training on the Blackburn Shark at Lee-on-Solent, which was then still under RAF control. The gunnery course was then taught at Donna Nook, near Grimsby, on the Westland Wapiti. The whole training pipeline lasted between nine and 12 months. During the interwar period telegraphist air gunners were in effect 'borrowed' from their source branch; they could be removed from flying duties and returned to their initial trade at short notice – flying was simply another job that the individual was trained to do.

Following the outbreak of war TAGs were recruited directly into the branch, being employed, according to their drafting letters, 'for the present period of hostilities', although some remained in the service after the war. Ken Davies recalls applying to join the Fleet Air Arm as a pilot, but as there was no shortage of volunteers for the pilot branch he was told at the recruiting office that he could join as a TAG and transfer to pilot later on. Once training commenced it was revealed to him that this was completely untrue, and a TAG he was to remain. Ken, like all TAGs, carried out his initial five weeks' training at HMS Royal Arthur. This involved naval general training such as drill, physical training and various medical and dental inspections, and was carried out alongside ratings training for other branches of the Royal Navy. After a week's leave trainee TAGs then moved on to HMS St Vincent to join the 'goons' (trainee officer aircrew).

A two-month signalling course at HMS Kestrel, Worthy Down, followed; Part One of the course revolved around wireless theory and Morse code, with regular tests to ensure that the TAGs were now able to receive and transmit messages at a speed of 12 words per minute, as opposed to the eight words expected during testing at St Vincent. From 1943 onwards many TAGs were sent to Yarmouth in Nova Scotia, Canada, for this stage of training. Other training evolutions involved radio repair and maintenance, armaments, semaphore, coding, and general duties such as cleaning for rounds and standing guard.

The Fairey Swordfish was the workhorse of the FAA throughout the entire war. The 'Stringbag' was rugged, surprisingly manoeuvrable despite its antiquated appearance, and – as long as it did not face modern fighter opposition – uniquely suited for its role as a maritime strike aircraft, given its benign handling qualities. Its chances of survival if intercepted by monoplane single-seaters were tragically slim, however.





Deck crews work with two Sea Hurricane Mk IIc fighters of 835 NAS aboard the escort carrier HMS *Nairana*, 1944. The Sea Hurricane was a robust aircraft that adapted well to the rigours of carrier operations, and was popular with the deck crews who worked on them. Although the IIc was heavily armed with four 20mm Hispano cannon, it was outdated as a fighter by 1944.

Up until this point the trainee TAGs had been given only one air-experience flight, as a taster of what was to follow before undertaking their three-month classroom-based course. Then began a 60-hour flying course in Sharks, Proctors and Lysanders at Worthy Down, or in Swordfish for the TAGs in Nova Scotia. The first three weeks of training with aircraft, however, were confined to tuning and operating radios in the classroom or aircraft on the ground. Initial airborne exercises instructed them in communications between the aircraft and the airfield; initially these were in the immediate vicinity of the airfield, but as the course progressed the exercises extended to cross-country flights and contacting other aircraft. Graduation from this stage of training required that the trainee be able to transmit and receive at 18 words per minute, as well as demonstrate a sound level of competence in wireless procedure, reconnaissance, and spotting and visual signalling.

Nine months after starting at HMS Royal Arthur, TAGs were posted to HMS Vulture at St Merryn in Cornwall for live firing instruction, in Swordfish and later Albacores. Gunnery training typically consisted of sorties of two aircraft, each with a TAG firing at a drogue target towed behind a third aircraft. To save on expense, one TAG had his ammunition painted white so that when the drogue was recovered the accuracy of the two TAGs could be told apart – one set of bullet-holes would be bordered with white paint. This course, lasting for five weeks, also taught aircraft recognition, sighting theory, and maintenance and repair of machine guns. The TAGs then returned to Worthy Down to await drafting to a frontline squadron; there was nothing as lavish as a passing-out parade for TAGs when they finally received their wings.

On commencing training TAGs were initially rated as naval airmen 2nd class, being rated up to acting leading airmen on beginning flying training, and to leading airmen after a year. After a further year, TAGs could take a 'pass professional' exam to be rated up to acting petty officer; yet another year led to promotion to full petty officer – although there were often delays in this system, since TAGs could only take their 'pass professional' when posted back to the UK. This differed from the pre-war system, under which TAGs were not promoted by virtue of their branch, and could serve as fully qualified frontline aircrew in the rating of able seaman.

Mechanic training

Naval air mechanics underwent the same generic five-week new entry training common to all Royal Naval ratings, at HMS Royal Arthur. Fleet Air Arm mechanics could then be trained in one of four specializations: engine, electrical, ordnance or airframe. The majority of ratings would be trained as mechanics, whereas those who had a service apprenticeship or were reservists with applicable skills from their civilian occupation were trained as artificers.

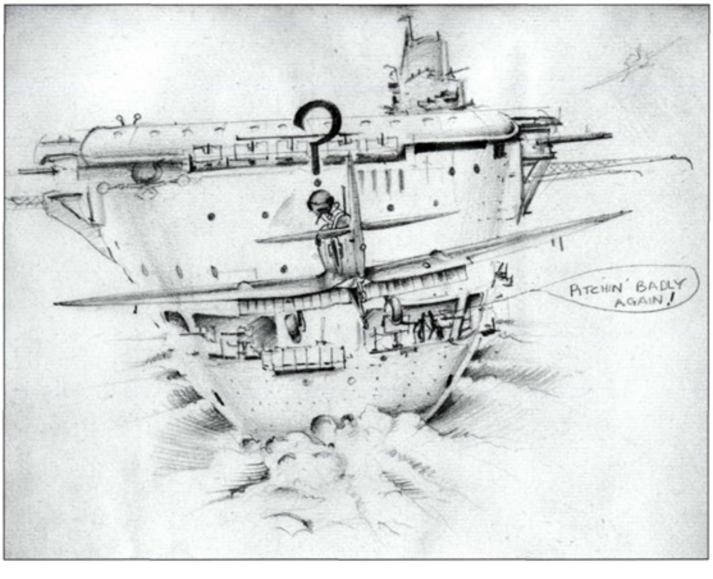
Ordnance mechanics were instructed in the maintenance and servicing of bombs, torpedoes and machine guns by the RAF gunnery school at Sheerness, before proceeding to Worthy Down for further training. Airframe mechanics were taught their trade at RAF Henlow and RAF Locking; this included training on the principles of flight, and fabric repair. On completion of branch training, naval air mechanics were sent to HMS Daedalus at Lee-on-Solent to await drafting; there was no automatic promotion for mechanics upon completion of training.

Recruitment and training of artificers ('tiffs') was more specialized. They had to pass two examinations in mathematics and science to prove their aptitude; FAA tiffs then carried out their basic training at Seafield Park, an outstation of Lee-on-Solent, where they were separated into the same four branches as naval air mechanics. The first month consisted of naval general training – classroom lectures, PT, squad drill and rifle drill. Tiffs then moved on to the Mechanical Training Establishment at Rosyth to be trained in basic fitting, workshop drawing and practice, and schooling in maths and science. This common phase of training lasted for nine months, before they were posted to Newcastle for two years' trade training.

Practical trade training was conducted at Westlands; electrical trade tiffs were taught electricity, magnetism and radio and valve theory. Engine and ordnance tiffs were trained further in metal machining, while airframe trainees received tuition in fabric repairs and sheet metal work. The total time required to train an air artificer was just under three years, compared to the four years taken to train branch members before the war.

FDO training

RAF experience during the Battle of Britain had proved beyond all doubt that radar, combined with fighter controllers, greatly increased the efficiency and success of directing fighter aircraft on to their targets. The Royal Navy had also worked up with radar interception before the war, with the radar-equipped HMS *Sheffield* directing aircraft from HMS *Ark Royal.* In 1941 the Fighter Direction Officer training centre was established at RNAS Yeovilton; the first CO of 'D School' (as it was known) was Lt E.D.G. Lewin, who had won the DSC at the Battle of the River Plate in 1939 (see below, 'Campaigns').


PITCHIN' BADLY AGAIN!

This sketch is taken from the Line Book of 880 NAS; the DLCO's bats are just visible at the left above the 'round down' of the flight deck. The Line Book was a traditional informal record used to document the more humorous aspects of the squadron's daily life.

Early FDO training was primitive, but nevertheless highly effective. Ratings were given requisitioned Wall's Ice Cream delivery tricycles fitted with a VHF receiver and headphones, a compass, and a metronome to govern their speed of cycling. Trainee FDOs would then vector the 'fighter' tricycles towards the 'enemy bomber' tricycles by transmitting speeds and courses for the 'fighters' to follow. By 1942, D School was expanding into new accommodation, and by 1943 it was training up to 80 FDOs at any one time. The course was now formalized at approximately three months, with tuition in radar theory and practice, signalling, meteorology, and navigational and radar plotting. After initial practice at controlling tricycles, FDOs were now able to control real aircraft from 790 NAS, and in their final week the trainees would direct fighters from the carrier HMS *Pretoria Castle*.

DLCO training

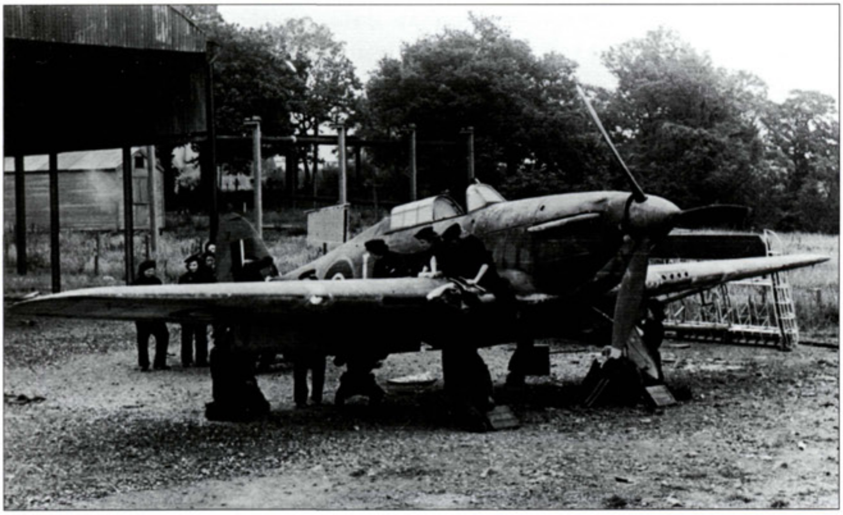
The complexities of landing an aircraft on the pitching deck of an aircraft carrier gave rise to a new branch – the Deck Landing Control Officer. DLCOs ('batsmen') were trained pilots, who used two high-visibility paddles resembling table tennis bats to issue signals to aircraft on finals to land on carriers. Batsmen were trained for three weeks at RNAS East Haven, directing the aircraft of 731 NAS. While initially all batsmen were experienced pilots and volunteers, as the war progressed the need for greater numbers in this vital branch saw more junior pilots 'being volunteered' away from flying duties for DLCO training.

As well as instruction on how to signal different aircraft types to make a safe approach, DLCOs were also trained in taking charge of ranging the aircraft on deck, spreading and folding the wings, removing damaged aircraft after forced landings, and fire-fighting.

A course of Wrens carry out rifle drill; early training for the WRNS included the generic Naval General Training to which all branches were subjected.

Meteorologist training

While the Meteorology Branch was not a part of the Fleet Air Arm, its work had a very direct and important effect on day-to-day naval air operations. Within the Meteorology Department on any airfield, junior ratings would take routine observations on conditions that would affect flying – wind speed and direction, cloud base and tops, temperature and dew point, and local pressure settings for altimetry. The training for this role would take place on site and would normally last for six weeks. Senior ratings and officers in this department would carry out the role of forecasters, collating the information supplied by the junior ratings and other sources to predict the weather – to a high



Wrens carry out more technical training on the airframe of a tired-looking Sea Hurricane Ib. Due to the demand for front-line aircraft, unsalvageable or obsolete machines were often sent to training units for the instruction of trainees in basic maintenance principles.

degree of accuracy over the next 24 hours, and the trends that could be expected over the next few days.

A notable example of this branch's work was that of 771 NAS, who detached a flight to the Orkney islands in August 1939 to carry out THUM (Temperature and Humidity observations). This involved a two-man crew flying to the very limits of their aircraft's operational altitude while the TAG used a precision aneroid barometer and psychrometer to record meteorological data at various heights; the climb, in open-cockpit Swordfish, almost invariably ended above the freezing level. This information would then be passed on to naval meteorologists and used for weather forecasting; by the end of 1940, 771 NAS' THUM flight base at Hatston was one of only three air stations providing upper-air observations in the entire UK.

WRNS training

The Women's Royal Naval Service ('Wrens') had initially been established during World War I to help free up shore-based posts so that more men could be sent to the front line. In 1939 the Admiralty proposed that the WRNS be re-formed, and appointed a veteran of the Great War service, Vera Mathews, as Director; the first volunteers began training just after the outbreak of hostilities that September.[1]

Initially WRNS officers and ratings were not employed in any branches that could be considered a specific part of the Fleet Air Arm, although they were employed on naval air stations in various roles. Many of the early Wrens were 'immobile' – that is, they were recruited only from the four main naval port cities and their terms of service did not permit their being posted away from their homes; this naturally caused problems over recruiting Wrens to work at naval air stations, most of which were situated in isolated areas.

Wrens were employed as parachute packers and battery chargers for FAA squadrons from the summer of 1940, and in spring 1941 the first women were sent overseas, to carry out accounting and clerical duties at the Observers School in Trinidad. Shortly afterwards the first course of

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[1] See Men-at-Arms 357, *World War II Allied Women's Services*

Wrens were selected for training as radio mechanics, although this training pipeline was not formalized until May 1942. Wrens were then given the same training courses as their male counterparts, being instructed in wireless transmission and radar direction finding. The majority of these women were employed on naval air stations in the day-to-day servicing of aircraft, and often carried out their tests and repairs while airborne. Wrens were also trained to work on aircraft fabric and assisted the squadrons' maintenance organization in carrying out airframe repairs. This was later extended into the Maintenance (Air) branch of the WRNS, which saw Wrens working in every unspecialized branch of aircraft maintenance. By 1944 over 1,400 Wrens were employed as air mechanics.

Wren ratings were also employed in NAS meteorology departments where, after six weeks' training, they carried out routine weather observations and provided aircrews with information on local conditions. By the end of 1942 Wren officers were permitted to enrol on the meteorological course at RNC Greenwich, after which they were employed as fully qualified forecasters. Wrens were also trained at the Royal Navy Schools of Photography and Air Photography. These women were employed not only in regular photographic duties, particularly with regards to aircraft recognition, but also in the development and analysis of torpedo-drop footage, and in camera-gun film assessment of pilots' aim and combat results. Cine-gun assessors would use projectors in conjunction with a model of the target, range and deflection tables to plot the pilot's gunnery on a graph. Wrens also assessed bombing and rocket fire, at ranges manned entirely by Wrens which – since they also doubled as emergency landing grounds – required that the women be dual-trained as ambulance and fire-tender drivers in addition to their normal duties. With the increases in knowledge of aviation-specific medicine, some Wrens also served as vision testers and orthoptists, the latter being required to have already passed the equivalent civilian qualifications before joining the WRNS.

While not a specific branch of the FAA, a small number of Wrens were also involved in the manning of anti-aircraft defences; while only a handful of these women were specifically posted to AA gun batteries, there are accounts of Wrens operating AA defences during enemy air raids. Their admirable example underlines the fact that during World War II the WRNS massively outgrew its initially intended role simply to 'Free a man for the Fleet'. At its peak strength in 1944 the service had some 75,000 women employed in more than 90 trades and categories, many of whom were directly involved with naval aviation. In all, 100 Wrens were killed in action during the course of their duties.

COMMAND STRUCTURE

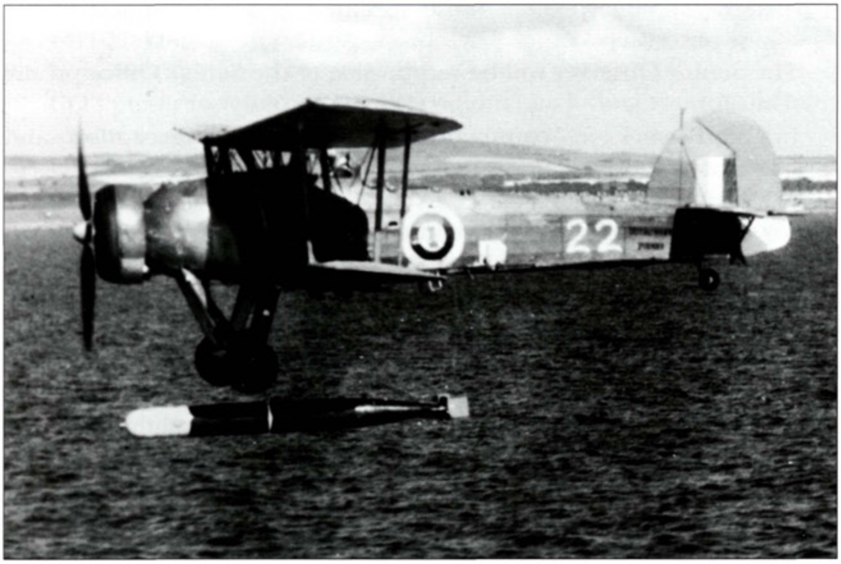
Overall command of and responsibility for the Fleet Air Arm fell to the Fifth Sea Lord, who was a member of the Board of Admiralty. This post was only established in 1938 as the Chief of Naval Air Services, responsible for preparation and management of all of the Royal Navy's aircraft and air personnel. The Fifth Sea Lord was assisted in his day-to-day duties by Rear Admiral Naval Air Stations, based at Lee-on-Solent.

810 NAS photographed at RNAS Buiscough in January 1945. The squadron CO, LtCdr(A) P.C. Heath (centre front), is the only regular RN officer, the remainder of 810's aircrew being made up of RNVR officers identified by their 'wavy' rank stripes. The Senior Pilot ('Splot'), to Heath's right, and the Senior Observer ('Sobs') to his left, are both RNVR lieutenants.

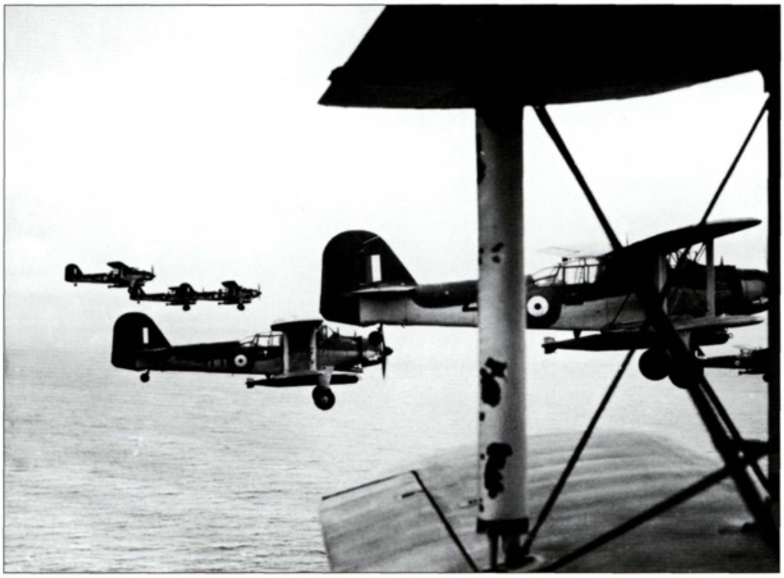
His role was to direct and co-ordinate the work of the Fleet Air Arm's shore bases; to be responsible for the drafting and appointment of FAA officers and the drafting and advancement of ratings; and to liaise with RAF authorities.

Squadron composition

Sharing a common ancestry, the FAA borrowed heavily from the RAF in terms of structure. The base unit was the squadron, which typically was composed of 12 aircraft. Whereas initially RAF squadrons were spilt into two flights of six aircraft, the flexibility needed during embarked operations demanded a more fluid structure. Until 1933, naval aircraft were organized into flights; Adm Henderson then became Rear Admiral Aircraft Carriers, and reorganized the flights into larger squadrons. This gave each unit more capability, and allowed aviators to be promoted to the rank of lieutenant commander – flights had previously been led by



A Swordfish of 785 NAS, flying from Crail in 1941. The number '22' has been applied hastily to the fuselage as its sole identification marking. 785 NAS served throughout the war as a Torpedo Bomber Reconnaissance training squadron.



Fairey Albacores of 827 NAS training in the Firth of Forth, January or February 1941. Note the marking '4M' (centre); the numeral '4' identifies this as a Torpedo Spotter Reconnaissance squadron, followed by individual aircraft letters. The Albacore was designed as a replacement for the Swordfish, but although it saw a good deal of action in the Mediterranean it was removed from front-line service in November 1943, long before the 'Stringbag' was retired.

lieutenants. Admiralty Fleet Orders 1939 stated that 'The Senior Executive, RM(A) or RAF Officer will be in command of the unit to which he is appointed, and responsible for its general efficiency and for the conduct of its operations…'

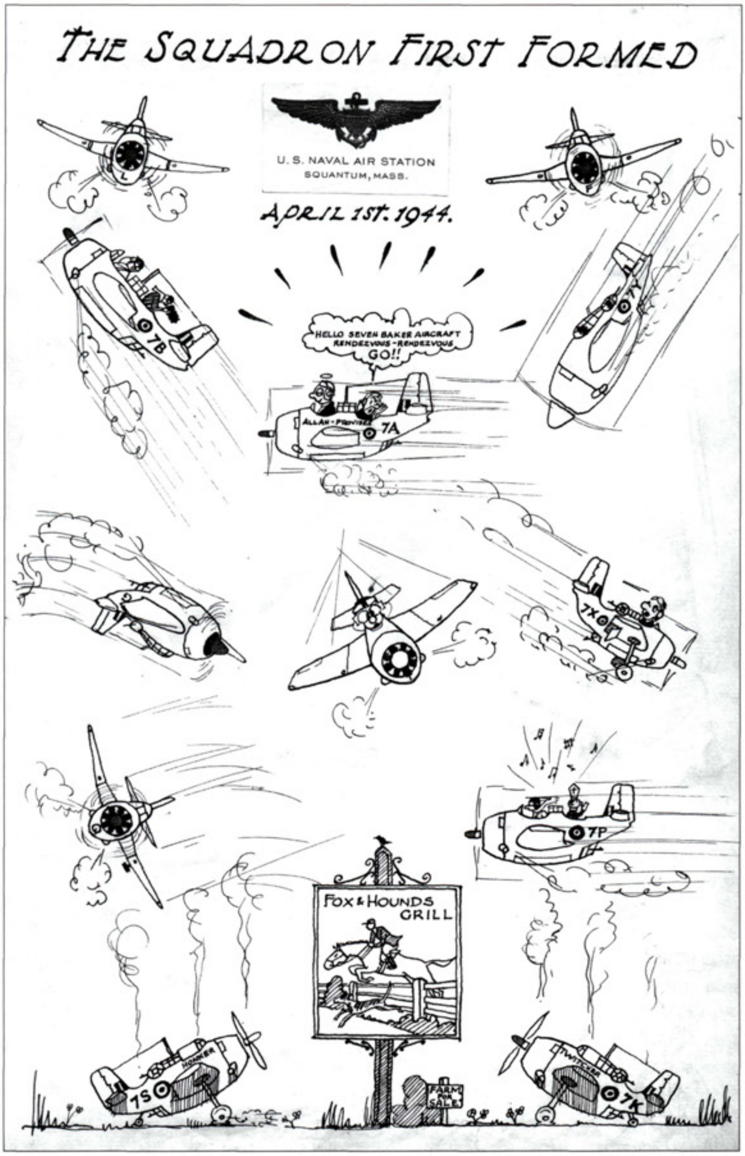
The squadron commanding officer was the most senior officer – initially a pilot, but later in the war observers were also eligible for the post. Technically he could come from any of the three armed services, but in practice only Royal Navy or Royal Marine officers commanded naval air squadrons during the war. Typically the squadron CO would be a lieutenant commander, although with smaller squadrons, or later on in the war, it was not uncommon for a senior lieutenant to lead a squadron. As stated above, immediately prior to the Inskip Report, FAA aircrew officers were required to be dual-commissioned, i.e. also to hold RAF rank; hence a squadron CO in the interwar period would be simultaneously a lieutenant commander RN and a squadron leader RAF.

The CO would be assisted in his day-to-day duties by a 'senior pilot' and – unless the squadron operated single-seat fighters only – a 'senior observer'. AFO 1939 outlined the responsibilities of both posts:

> The Senior Pilot will be responsible to the Senior Officer of the Unit for:
> (a) The technical administration of the unit
> (b) Flying discipline and training of pilots
> (c) Safety, and suitability of accommodation, of aircraft
> (d) Maintenance and readiness for service of aircraft and of their equipment [except those specified under the duties of the senior observer]
>
> The Senior Observer will be responsible to the Senior Officer of the Unit for:
> (a) Staff work in connection with search, interception and observation problems
> (b) Training of observers, observers' mates and air gunners
> (c) Communications and meteorological organization
> (d) Maintenance and readiness for service of navigational and W/T equipment, bombsights, and all equipment used solely by observers, observers' mates and air gunners.

AFO 1939 also carried on to define – in a degree of relentless detail that reads strangely to civilian eyes – the individual responsibilities in the air of each pilot, observer and formation leader. The squadron CO was responsible for:

> (a) Ordering an attack and giving any general directions regarding the objective and the methods to be employed
> (b) Ordering the engagement of enemy aircraft



The FAA had to await re-equipment with an American type before it acquired a modern torpedo-bomber. This is the opening page of the Line Book of 857 NAS, which was officially formed at Squantum, Massachusetts, with 12 Grumman TBM Avengers. 857 NAS, under the command of LtCdr(A) W. Stuart, embarked on HMS *Rajah* in June 1944 before transferring to the fleet carrier HMS *Indomitable* in November; it served with distinction in the Far East, including the Palembang raids of late January 1945.

(c) Breaking W/T silence
(d) Authorizing signals based on general inference as opposed to routine observations
(e) Altering or terminating the operation in progress
(f) General safety of the unit…

The pilot at the controls of an aircraft will be responsible for the execution of:

(a) All manoeuvres in the air
(b) The tactics of air fighting, torpedo and bombing attacks
(c) Movements of the aircraft when land-, ship-, or water-borne; when landing and taking off, or being launched or hoisted on board, and for making decisions definitely governed by his own ability to fly or by conditions which he alone could determine in time.

The pilot at the controls of the leading aircraft of a formation will be responsible for the execution of all manoeuvres by the formation…

An observer on duty in an aircraft will be responsible for:

(a) The navigation of the aircraft on all occasions when navigational methods are employed
(b) Control of the signalling of the aircraft [except when limited by the CO's power of veto over breaking W/T silence]
(c) Making observations and reports [again, excepting the CO's power to veto routine observations] including spotting or other special observing.

On the ground, whoever was the more senior of the senior pilot and senior observer (commonly shortened to 'Splot' and 'Sobs' respectively) was the squadron's second-in-command. The RN's familiar divisional system was also actively employed within the Fleet Air Arm: this placed groups of ratings into 'divisions', each of which was the responsibility of a divisional officer (DO) assisted by a divisional senior rating. Pilots and observers were divisional officers for mechanics, and typically the senior observer would be the divisional officer for the telegraphist air gunners. The DO was responsible for the discipline and wellbeing of those in his division, and would write their periodic assessment reports.

AFOs also clearly stated the manning requirements for each squadron in terms not only of aircrew, but also of maintenance and administrative personnel. The requirements for frontline units were laid

Squadron manning requirements (AFO 1939)

The following provisional complements have been approved for Fleet Air Arm Units during the transitional period. They will take effect from the 24th May, 1939… Until a sufficient number of Naval Officers and ratings becomes available, RAF personnel will be borne in certain vacancies in lieu of Naval personnel. Royal Marine Officers of the Fleet Air Arm may be borne in lieu of Naval Officers of equivalent rank shown in these complements.

TSR Squadron of 12 Swordfish Aircraft
Naval Flying Personnel
LtCdr(P) or (A)… 1 [squadron CO – an Executive Branch officer trained as a pilot, or from Air Branch]
Lt or Sub Lt(P) or (A)… 11 [pilots, including the senior pilot]
LtCdr or Lt(O) or (A)… 12 [observers, including the senior observer, again either from Executive Branch trained as an observer, or Air Branch]
PO Airman… 1 [PO TAG, the most senior TAG in the squadron]
Ldg or Airmen… 11 [other squadron TAGs]
RAF Maintenance Complement for each Squadron
Flt Sgt Ftr… 2
Sgts Ftr… 4
Cpls Ftr I… 4
AC Ftr II(A)… 1 [airframe 'rigger']
AC Ftr II(E)… 1 [engine 'fitter']
Cpl Ftr II(E)… 1
Cpl WEM… 1 [wireless electrical mechanic]
Flt Rigs… 12 [riggers]
Flt Mech… 12
A/c Arm… 4 [armourers – replaced by naval ordnance ratings]
A/c Electn… 4 [electricians]
Instrument Repairers… 2
Photog… 1
Naval Administrative Personnel
CPO or PO Airman… 1
Ldg Seaman… 2
ABs or Ords… 10 [able or ordinary seamen]
Ldg Writer… 1
Ldg Supply Asst… 1
Supply Asst… 1
Cooks… 2
Royal Marines… 12

2-Seater Fighter Squadron of 9 Skua Aircraft
Naval Flying Personnel
LtCdr(P) or (A)… 1
Lt or Sub Lt(P) or (A)… 5
LtCdr or Lt(O) or (A)… 1
PO Airmen… 5 [3 rating pilots, 2 rating observers]
Ldg or Airmen… 6

down by means of a generic list for each squadron role – for training units, early war AFOs stated the manning requirements for each individual squadron, although this practice was not possible once the Fleet Air Arm expanded from its embryonic state.

The requirements for a Fairey Swordfish and a Blackburn Skua squadron are shown in the table above; the latter, for a two-seat fighter squadron, highlights some of the key differences between RAF and RN practice. The inclusion of three observers and six TAGs in a nine-aircraft squadron reflected the FAA policy at that time of only having the lead aircraft in a three-aircraft section crewed with an observer, the remaining two aircraft being crewed with TAGs alone. This, of course, was subject to operational requirements and the CO's discretion, and the crew composition of a flight of aircraft was always very flexible.

The first unit to receive the Blackburn Skua, the FAA's first operational monoplane, was 800 NAS in October 1938. Although the Skua scored the first confirmed British air-to-air 'kill' of the war, and was the first aircraft to sink a capital ship from the air, it was a mediocre dive-bomber and a very poor fighter. The Skua was handicapped by a design specification that demanded two completely different aircraft roles to be forced together in one awkward two-seat airframe.

HMS *Ark Royal* displaced 22,000 tonnes and was 800 feet long; entering service on 16 December 1938, she was the Royal Navy's only modern carrier when the war broke out.

Also of note is the inclusion of rating pilots and observers. Non-commissioned pilots and observers were uncommon in the regular interwar Royal Navy; similarly, rating pilots in the RNVR were often individuals who had successfully completed flying training but had failed some part of their officer training.

Embarked air groups

When squadrons embarked aboard aircraft carriers there was also a clear chain of command, with associated responsibilities laid down. During the interwar years each aircraft carrier would have embarked a 'senior RAF officer', who was responsible for the overall conduct of all squadrons onboard. Accompanying him was the carrier's senior observer, who was the most senior RN aircrew-trained officer and acted as a liaison between the embarked squadrons and the Executive Branch who operated the vessel itself. Following the Royal Navy's regaining control of the Fleet Air Arm, AFO 39 replaced these two posts with a 'commander or lieutenant commander (flying)' (known as 'Wings'), and a 'commander or lieutenant commander (air staff)'. These positions were defined as follows:

> Commander (Flying) will be responsible for:
>
> (i) The technical administration, discipline [later deleted] and organization of the Fleet Air Arm department on board
>
> (ii) Co-ordination of maintenance and readiness of squadrons embarked.
>
> Commander (Air Staff) will be responsible to the Captain for the co-ordination of ... training of the squadrons embarked.

Commander (Flying) and (Air Staff) will also act as staff officers for planning and ordering air operations and exercises.

As with squadron personnel, AFOs also laid down the numbers of FAA executive personnel embarked on each carrier. The table at the top of page 24 details the composition of the executive of the air groups embarked on the four cariers in service in 1939.

Executive Branch manning of embarked Air Groups (AFO 1939)

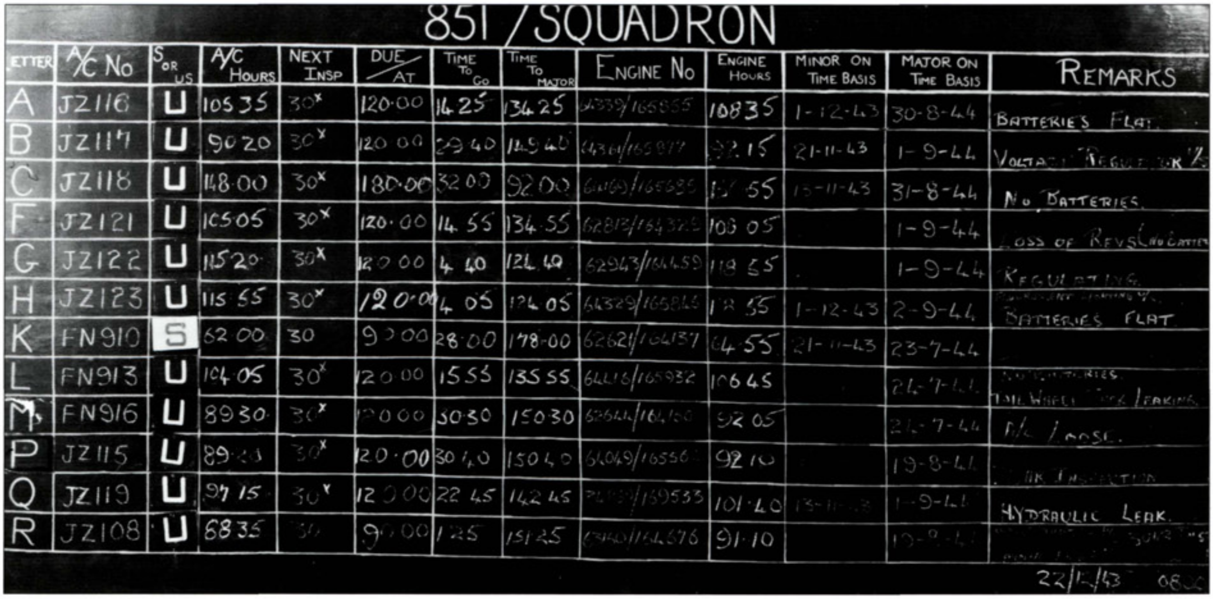
Rank or Rating	HMS *Ark Royal*	*Eagle*	*Glorious*	*Furious*
Cdr(P) or (A)	1	1	1	1
LtCdr(P) or (A)	1	1	1	1
Lt(P) or (A)	2	1	1	1
Cdr(O) or (A)	1	1	1	1
LtCdr(O) or (A) or Lt(O) or (A)	1	1	1	1
LtCdr(AE)*	1	1	1	1
Warrant Observer	1	1	1	1
Warrant Offr (Ftr I)	1	–	1	1
Warrant Supply Offr	1	1	1	1
CPO Airman**	1	1	1	1
PO Airman	1	1	1	1
Petty Officer	5	3	3	3
Ldg Seaman	7	3	7	6
ABs or Ords	61	32	49	41

Notes:
* = (AE) designated Air Engineering; the LtCdr(AE) had overall responsibility for the entire air maintenance organization while embarked, and was often an 'upper yardsman' promoted from the lower decks.
** = an ex-rating pilot or observer

A third officer would join the carrier executive later in the war – the 'wing leader'. Emulating the RAF, the Fleet Air Arm would group several squadrons together into a wing, normally led by an RN lieutenant commander but sometimes by a Royal Marine major. Whereas RAF wings were usually composed of three squadrons, naval wings were much more variable depending on assets available, with some wings having as many as five squadrons, and some a single squadron. To avoid confusion with the RAF, FAA wings were given the prefix 'Naval' and also named after their role – e.g. 7th Naval Fighter Wing, or 11th Naval TBR Wing.

From June 1945 the British Pacific Fleet adopted the American practice of squadrons being formed together into Carrier Air Groups, normally led by a commander but in some cases by a lieutenant commander or Royal Marine major.

The Air Engineering Serviceability Board of 851 NAS, based at Mineriya, Ceylon, on 22 December 1943. Such boards detailed the hours remaining on each airframe and its engine until its next servicing became due. This board shows only one aircraft – FN910 'K' – serviceable out of a squadron of 12; in the final 'Remarks' column a number of the faults are listed as electrical, and others as hydraulic leaks.



851 /SQUADRON

ETTER	A/C No	S OR US	A/C Hours	Next Insp	Due / At	Time To Go	Time To Major	Engine No	Engine Hours	Minor On Time Basis	Major On Time Basis	Remarks
A	JZ116	U	105 35	30^{x}	120·00	14 25	134 25	64339/165855	108 35	1-12-43	30-8-44	Batteries Flat.
B	JZ117	U	90 20	30^{x}	120 00	29 40	149 40	64361/165877	[illegible] 15	21-11-43	1-9-44	Volta[illegible] Regu[illegible]
C	JZ118	U	148·00	30^{x}	180·00	32 00	92 00	64169/165685	[illegible] 55	13-11-43	31-8-44	No Batteries.
F	JZ121	U	105 05	30^{x}	120·00	14 55	134 55	62813/164325	108 05		1-9-44	Loss of Revs (no batteries)
G	JZ122	U	115 20	30^{x}	120 00	4 40	124 40	62943/164459	118 55		1-9-44	Regulating.
H	JZ123	U	115 55	30^{x}	120·00	4 05	124 05	64329/165845	1[illegible]8 55	1-12-43	2-9-44	Batteries Flat
K	FN910	S	62 00	30	90 00	28·00	178-00	62621/164137	64·55	21-11-43	23-7-44	
L	FN913	U	104 05	30^{x}	120 00	15 55	135 55	64416/165932	106 45		24-7-44	[illegible] Tail Wheel [illegible] Leaking.
M	FN916	U	89 30	30^{x}	120 00	30 30	150 30	62644/164150	92 05		24-7-44	R/c Loose.
P	JZ115	U	89 [illegible]	30^{x}	120·00	30 40	150 40	64049/16556[illegible]	92 10		19-8-44	[illegible] Inspection
Q	JZ119	U	97 15	30^{x}	120 00	22 45	142 45	[illegible]/169533	101·40	13-11-43	1-9-44	Hydraulic Leak.
R	JZ108	U	68 35	30	90 00	1 25	151 25	63410/164676	91·10		19-8-44	[illegible]

22/12/43 08[illegible]

One of the Fleet Air Arm's most successful wing leaders was LtCdr(A) R.J. 'Dickie' Cork, here photographed in a Sea Hurricane. Flying with 880 NAS from HMS *Indomitable*, Cork claimed five confirmed kills in a single day during Operation 'Pedestal' in the Mediterranean. He would be killed in a flying accident in China Bay in April 1944.

Mixed aircraft types

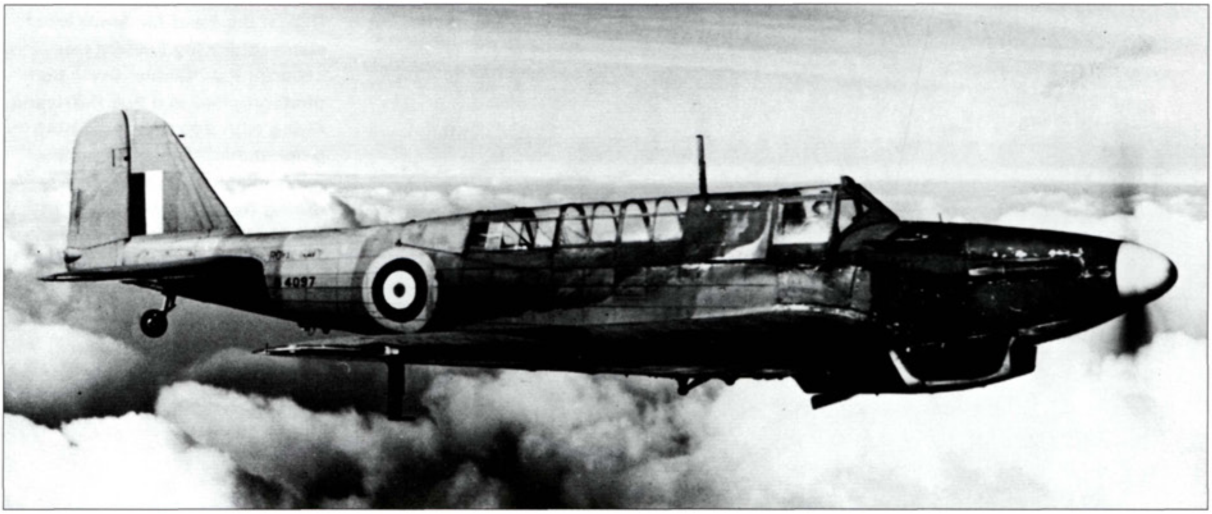
Wartime experience not only changed the structure of the FAA's embarked carrier air groups; developments were also made in the anti-submarine warfare discipline, from experience against U-boats in the Atlantic. One tactic was to change the number of aircraft in a squadron to fit its role; some ASW squadrons embarked on light escort carriers were equipped with 18 aircraft, typically 12 Swordfish and 6 Seafires. An ASW flight would consist of two Swordfish and a Seafire; the Seafire's job was to attack a surfaced U-boat with cannon and machine-gun fire to distract, if not neutralize the U-boat's defensive AA guns, while the two Swordfish would simultaneously attack with rockets and torpedo respectively. The success rate of these three-aircraft flights was far superior to that of single Swordfish operating alone.

Mixing aircraft types within a squadron was certainly not a rarity – operational necessities often led to squadrons using whatever aircraft they could salvage or cobble together in theatre. This was notably true in the desert of North Africa, where FAA squadrons operating from land used combinations of aircraft initially issued to the squadron, old aircraft donated by the RAF, and any useful machines found abandoned by the enemy. This flexibility again led to different practices from those of the RAF; whereas an RAF squadron in the early war years would have four sections of three aircraft, codenamed Red, Blue, Yellow and Green sections, the numbers of aircraft and callsign colours in FAA sections were left to the discretion of the squadron CO, and would often change depending on the task in hand.

Squadron numbering

While the composition of squadrons was very fluid, the squadron numbering system was particularly regimented. Each squadron's number would be allocated depending on the unit's primary role, as follows:

700 to 749 NAS: Squadrons operating catapult-launched aircraft from warships other than carriers. These squadrons were often equipped with more than 40 aircraft, separated between much smaller flights and distributed among the surface fleet.



A Fairey Fulmar of 761 NAS, flying from RNAS Yeovilton. The Fulmar entered service in 1940 as the Fleet Air Arm's first eight-gun fighter, with the same weight of fire as the RAF's Hurricanes and Spitfires but with three times the ammunition capacity and a far greater range. However, it was let down by its disappointing speed and manoeuvrability, unavoidable given its size (indeed, its resemblance to the Fairey Battle light bomber is obvious). This was due to the pernicious Admiralty doctrine of that time, which ruled that fighters had to carry a second crew member as observer. Despite being outclassed by enemy single-seat fighters, however, the Fulmar was still more than a match for Axis bombers, and at least five Fulmar pilots became aces in the Mediterranean in spring 1941.

750 to 799 NAS: Training and ancillary squadrons. These included target-towing aircraft, Fleet Requirements units used to support training, and Development units used to test new aircraft or captured enemy aircraft.

800 to 809 NAS: Embarked Fighter squadrons, later further categorized as Single-seat Fighter squadrons.

810 to 819 NAS: Embarked Torpedo Spotter Reconnaissance (TSR) and Torpedo Bomber Reconnaissance (TBR) squadrons.

820 to 859 NAS: TSR and TBR squadrons.

860 to 869 NAS: Series allocated for Royal Netherlands Navy TBR squadrons attached to the FAA; only 860 NAS was formed during the war.

870 to 879 NAS: Single-seat Fighter squadrons.

880 to 899 NAS: Embarked Single-seat Fighter squadrons.

1700 to 1749 NAS: TBR, Amphibious and Search-and-Rescue squadrons.

1750 to 1769 NAS: Not used – series intended for further Single-seat Fighter squadrons.

1770 to 1799 NAS: Two-seat Fighter squadrons.

1800 to 1809 NAS: Not used – series intended for further TBR squadrons.

1810 to 1829 NAS: Dive-bomber squadrons. Only 1820 NAS was formed, and was disbanded before reaching combat following an unsatisfactory evaluation of the Curtiss SB2C Helldiver.

1830 to 1899 NAS: Single-seat Fighter squadrons, later RNVR squadrons.

Squadron markings

Each aircraft had its own individual serial number painted on both sides of the rear fuselage at the factory where it was constructed – this remained unchanged throughout the life of the aircraft. Further numbers and letters were also required to identify the squadron to which the aircraft belonged, and these were added when it arrived with its unit.

During the interwar period the FAA had used several systems of identification, but immediately prior to the outbreak of war a single system was confirmed, which consisted of a letter/number/letter combination. The central number indicated the squadron's role: 1 to 5 for the spotter/reconnaissance squadrons, 6 or 7 for the fighter squadrons. The first letter indicated the carrier to which the squadron belonged, normally being the first letter of the carrier's name; the second letter identified the individual aircraft within the squadron. Thus, 'A6D' would identify aircraft 'D' from the fighter squadron (800 NAS) embarked aboard HMS *Ark Royal*.

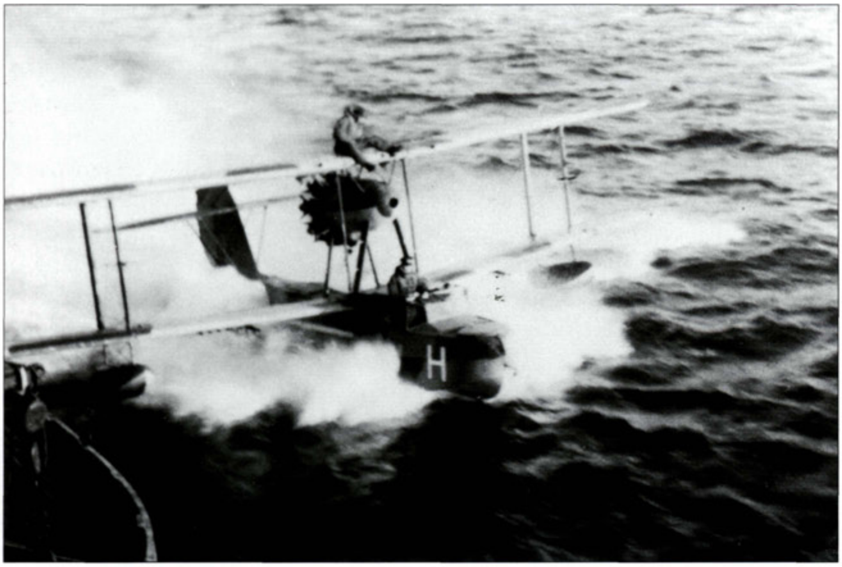
While this system was versatile enough for the FAA at the outbreak of the war, it soon proved too limited to accommodate the rapidly expanding number of aircraft, carriers and shore bases. In May 1941 naval air stations were given permission to adapt the numbering system to meet their own needs; variations included using two letters to indicate the aircraft's shore base, or placing a horizontal bar over 'doubled-up' individual aircraft letters in the case of larger squadrons – although this was soon replaced by using a two-letter system for individual aircraft.

In practice, perhaps the most common system used while embarked was retaining the role number and individual letter for each aircraft, while the letter indicating the parent carrier was most often omitted. In many cases even the role number was not used, leaving a single letter to identify the aircraft. The British Pacific Fleet adopted the American system of painting the carrier letter on the fin and a three-digit identification number on the side of the fuselage.

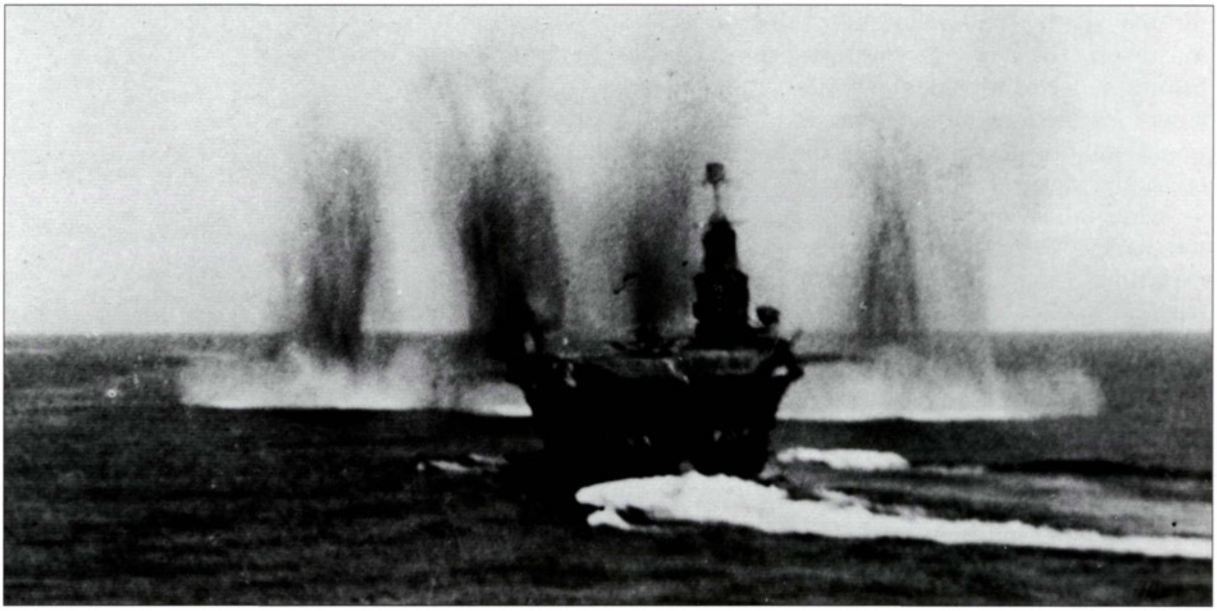
CAMPAIGNS

1939: The Western Approaches

The months following Britain's declaration of war on Germany on 3 September 1939 are often referred to as the 'Phoney War'. The RAF was occupied largely with dropping propaganda leaflets over Europe, and the British Army was not involved in large-scale combat operations. However, for the Royal Navy and its Air Branch there was nothing remotely phoney about this war: combat operations began immediately after the declaration of hostilities.



The Supermarine Walrus flying boat – known affectionately to its crews as the 'Shagbat' – entered service in 1935, and despite its antiquated appearance flew operationally until after the end of World War II in the gunnery-spotting, anti-submarine patrol and search-and-rescue roles. This 700 NAS machine has landed in an oil slick deliberately spread to calm the chop, and is about to be hooked on to HMS *Howe*'s recovery crane. Note the TAG sitting on the wing ahead of the 'pusher' propellor – the modern preoccupation with 'health and safety' was not shared by the Royal Navy of those more robust days.



HMS *Ark Royal* narrowly avoids damage from German bombing off the coast of Norway, 5 May 1940.

The Admiralty remembered the bitter lessons of World War I with regard to the threat posed by German U-boats, and merchant shipping was organized into convoys for collective defence. The initial plan was to deploy the Royal Navy's aircraft carriers as offensive anti-submarine assets in both the North-Western and South-Western Approaches to UK waters, the idea being that their very presence would deter all but the most foolhardy of U-boat commanders. To that end, HMS *Ark Royal* was deployed to the NW Approaches, and HMS *Courageous* and HMS *Hermes* were tasked with operating along the SW Approaches. Swordfish biplanes were used to search for U-boats, but at this early stage of the war no airborne radar was available, so searching was restricted to long hours spent peering down in hope of a visual sighting.

The Admiralty's plan worked in one sense – U-boat commanders were not frightened, but seduced away from the convoys, with the intent of carrying out attacks on the aircraft carriers themselves. On 14 September 1939, *Ark Royal* narrowly avoided a salvo of torpedoes from U-39 (Kapitänleutnant Gerhard Glattes), which was promptly sunk by the carrier's escorting destroyers. However, three days later *Courageous* would not be so fortunate. She had just recovered her last wave of Swordfish while on patrol just to the south-west of Ireland, and was steaming into the wind under the protection of only two of her four Asdic-equipped destroyers, when U-29 (KL Otto Schuhart) fired a salvo of three torpedoes. Two struck her just after 7.50pm; *Courageous* sank in just 20 minutes, taking with her 518 officers and men and the aircraft of her two Swordfish squadrons. The Admiralty immediately ordered the termination of aircraft carrier anti-submarine patrols.

On 26 September 1939 a Skua of 803 NAS became the first British aircraft of the war to achieve an air-to-air victory. A pair of Swordfish from *Ark Royal* had been tasked with flying cover for the damaged submarine HMS *Spearfish*; when they sighted three shadowing Dornier Do 18 flying boats, Skua fighters were launched from *Ark Royal* to intercept. In the ensuing combat Lt B.S. McEwen forced one of the

Dorniers down to the sea, where its four-man crew took to their liferaft. At least one other German aircraft was damaged by Skuas of 803; but the Dorniers were able to report *Ark Royal*'s position, and at approximately 2.00pm a formation of Heinkel He 111 bombers attacked the carrier. One bomb fell close enough to cause concern, but the *Ark* escaped without damage; this did not prevent the German propaganda machine issuing the first of its many bogus claims of her sinking.

December 1939 saw the Fleet Air Arm's first commendation of World War II when Lt E.D.G. Lewin was awarded the Distinguished Service Cross for his part in the defeat of the *Graf Spee*. Lewin, piloting the cruiser HMS *Ajax*'s Seafox seaplane, shadowed the German pocket battleship throughout the engagement that would come to be known as the Battle of the River Plate. His observer, Lt R.E.N. Kearney, spotted for the guns of *Ajax, Achilles* and *Exeter*, and Lewin and Kearney observed more than 30 hits on *Graf Spee*. The German warship was forced to break off the engagement and seek refuge in the waters of neutral Uruguay, anchoring off Montevideo on 13 December. After several days of frantic diplomatic and intelligence activity, *Graf Spee* weighed anchor on the evening of 17 December and sailed out into the estuary of the River Plate, where her crew scuttled her. Although *Ajax*'s Seafox was the only FAA asset airborne at the battle, the reported presence of *Ark Royal* in the vicinity was greatly influential on Kapitän Hans Langsdorff's decision to scuttle his ship.

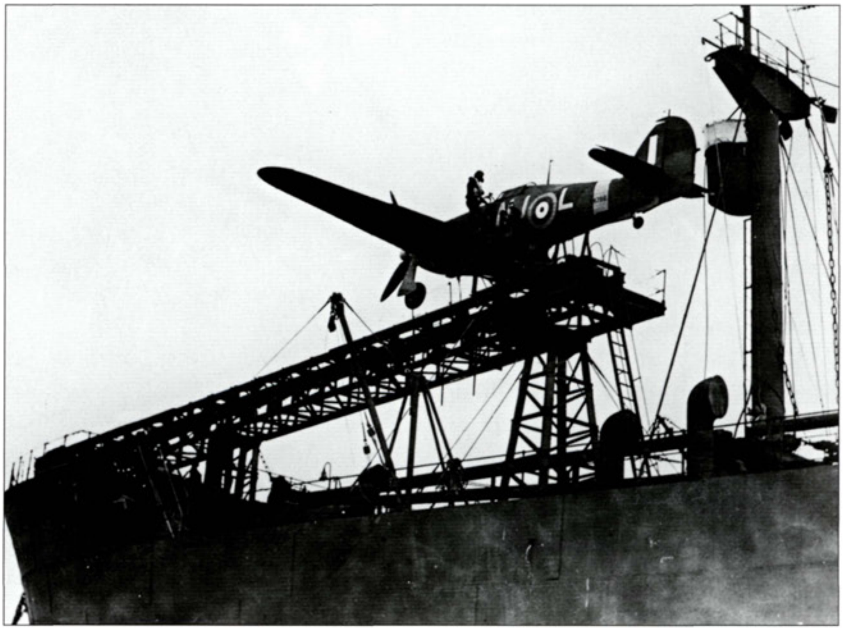
Four of the 58 Fleet Air Arm pilots who flew with RAF Fighter Command during the Battle of Britain achieved unofficial 'ace' status for five confirmed aerial victories that summer; these are two of them – S/Lts R.J. Cork and A.G. Blake, who were both awarded the DSC. 'Dickie' Cork (left) flew Hurricanes in No.242 Sqn led by Douglas Bader, and Arthur 'Admiral' Blake (right) flew Spitfires with No.19 Sqn; Blake scored four solo kills and one shared before he was shot down and killed on 29 October. Note the naval pilot's 'wings' badge, worn above the rank stripe on the left cuff only of the No.5 Dress jacket.

1940: Norway

The war began in earnest for the Fleet Air Arm in April 1940. Within 24 hours of the German invasion of Norway, 16 Skuas of 800 and 803 NAS navigated their way 300 miles across the North Sea from Hatston in the Orkneys to Bergen harbour, Norway, where the German cruiser *Konigsberg,* damaged by a Norwegian shore battery in the initial phase of the invasion, now lay alongside. The Skuas, under the command of Lt W.P. Lucy of 803 NAS and Capt R.T. Partridge RM of 800 NAS, attacked the cruiser out of the sun with 500lb bombs. Three direct hits and several near misses pounded the German vessel, while several aircraft also hit the harbour facilities with bombs and machine guns. For the loss of only one aircraft the FAA had made history: the *Konigsberg* was the first major warship ever to be sunk by an air attack in combat (though to naval fury, the British media credited the RAF with this success).

Within 48 hours Swordfish of 816 and 818 NAS launched from the veteran carrier HMS *Furious* to carry out the first carrier air torpedo attack in naval warfare; three German destroyers in Trondheim harbour were targeted but, frustratingly, the torpedoes struck a sandbar in shallow water. *Ark Royal* and *Glorious* arrived shortly afterwards with their own embarked aircraft, and a co-ordinated aerial campaign was conducted in the skies over Norway. Swordfish were employed with great success both against enemy shipping and against ground targets in support of the British Army. Meanwhile, the Skuas and Sea Gladiators were used to intercept German bombers, claiming more than 20 air-to-air kills during the brief campaign. After a promising start this was to take a bitter turn; unable to maintain pressure in Norway after losses in France, the government made the decision to withdraw the Allied expeditionary force.

After recovering the Hurricanes of 41 Sqn RAF, Capt D'Oyly Hughes of HMS *Glorious* controversially elected to sail for Britain without launching any escorting aircraft. The German battlecruisers *Scharnhorst*



The first version of the Hawker Sea Hurricane to enter service was the Mk Ia. This was simply a standard Hurricane fitted with catapult spools, and was launched from specially adapted Catapult Armed Merchant ships to protect convoys. The 'Hurricats' – flown by volunteers, many of them RAF pilots – could not return to their CAM ship after engaging enemy aircraft. If they were lucky, land might be close enough to reach; otherwise their only options were parachuting or ditching near friendly vessels after their one and only sortie. In the freezing waters of the North Atlantic their chances of survival were often slim.

Believed to be an aircraft of 809 NAS on HMS *Victorious* in 1942, this Fairey Fulmar makes an emergency recovery, with one wheel still locked up. Although severely outclassed by modern land-based fighters, the Fulmar was actually responsible for more kills than any other FAA fighter type – an impressive testament to the skill of its pilots.

and *Gneisenau* were able to close on the carrier without being detected, and after beating back a valiant defensive effort by her two escorting destroyers they sank *Glorious* after a brief 50-minute engagement. More than 1,500 lives were lost from the three warships, most of them drowning or freezing to death in the icy waters of the North Sea.

During the action *Scharnhorst* had been damaged by a torpedo from HMS *Acasta*, one of the carrier's escorting destroyers, and consequently both German battlecruisers retreated to Trondheim for repairs and maintenance. A plan was put together to attack them at anchor in the hopes of repeating the success at Bergen harbour; 15 Skuas from 800 and 801 NAS, escorted by six RAF Blenheims, would bomb the ships as they lay alongside, while simultaneously four RAF Beauforts would attack the nearby airfield at Vaernes as a diversion. The Skuas launched from *Ark Royal* shortly after midnight on 13 June. Unfortunately, the Beauforts had attacked Vaernes early, so the German defences were alert, and there was no sign of the escorting Blenheims. Navigating 100 miles after crossing the enemy coast in clear skies, the Skuas were easily detected and repeatedly attacked by German fighters and heavy flak; eight Skuas were lost in the raid, and only one bomb hit the *Scharnhorst* – and failed to explode. The Norwegian campaign had ended in tragedy for the Fleet Air Arm, costing it many of its most experienced crews.

France, and the Battle of Britain

While battles were fought in the seas, skies and fields of Norway, the British Expeditionary Force had also been locked in combat against German Army Group A in Belgium and France. The Allied forces failed to repulse the German mechanized offensive, and the decision was taken to evacuate the BEF. Between 22 May and 4 June more than 330,000 Allied soldiers were evacuated from the beaches of Dunkirk during Operation 'Dynamo', by an armada of military and civil shipping, and the already thinly stretched Fleet Air Arm was committed alongside the RAF to provide air cover. Skuas were involved in air-to-air combat over the beaches and the English Channel, protecting ships from German bombers and also flying alongside Albacores to attack German ground forces. Remarkably, FAA student pilots flying tiny Tiger Moth training biplanes were also used to drop off food and medical supplies for the troops waiting on the beaches.

With German forces now occupying Norway and the whole northern coast of NW Europe much of the UK was within range of aerial assault. While the Battle of Britain raged in the skies of England during the summer of 1940, two Fleet Air Arm squadrons – 804 and 808 NAS, flying Sea Gladiators and Fulmars respectively – operated under the control of the RAF's 13 Group in the north of England and Scotland. A further 58 FAA pilots were temporarily attached to RAF fighter squadrons during the Battle; 18 of them were killed in action, and 12 made claims. Four naval fighter pilots – S/Lts A.G. Blake, R.J. Cork, F. Dawson-Paul and R.E. Gardner – each scored at least five confirmed aerial kills during that summer.

The Mediterranean: Force H

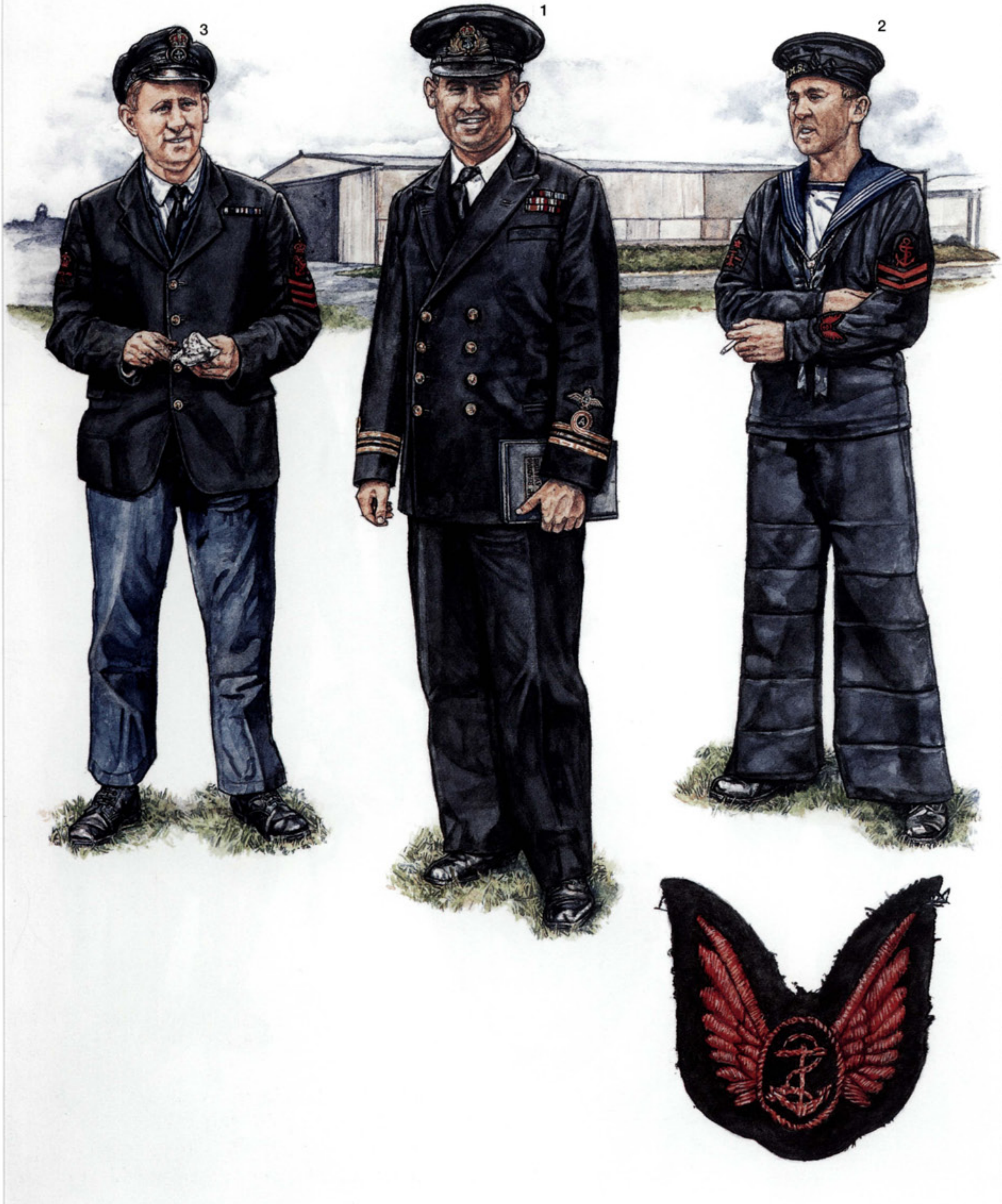
Of all the theatres where the Fleet Air Arm fought throughout the war, it was in the Mediterranean that it would prove the most valuable. As well as the serious threat of German forces in the Mediterranean, the British also had to contend with both the Italians – who had declared war at a judiciously picked moment in June 1940 – and potentially with the Vichy French forces, after France concluded an armistice with the Axis. Few French warships sailed for Britain to carry on the fight, and Prime Minister Winston Churchill's government was faced with the prospect of the still-powerful French fleet being constrained to join the Axis war effort. This possibility could not be risked, and the bitter decision was taken to attempt to disable the navy of Britain's lost allies.

Force H, a task force assembled around HMS *Ark Royal* and the battlecruiser HMS *Hood* under the command of Adm Somerville, was despatched to the Mediterranean on 3 June 1940. On 3 July – when the French had refused an ultimatum to either join the British, hand over their ships, scuttle them, or sail to a neutral port – Force H shelled the warships anchored at Mers-el-Kebir in Algeria, killing some 1,300 French sailors. During this tragic episode *Ark Royal*'s Swordfish spotted for Force H's guns, and also laid mines at the harbour's entrance to prevent escape. The battleship *Bretagne* was destroyed and several other ships crippled; however, the battleship *Strasbourg* and six escorting destroyers escaped, fleeing for Toulon. *Ark Royal*'s Swordfish attacked without success – the first time aircraft had ever attempted to torpedo a capital ship at sea 'in anger'. Five days later six Swordfish of 814 NAS launched from HMS *Hermes* and attacked the French battleship *Richelieu* at Dakar in Senegal, causing enough damage to keep her out of the war for a year. With the capabilities of the Vichy French navy severely reduced, Force H in the central Mediterranean could concentrate on the Italians.

On 9 July, Force H was attacked by 40 Italian Savoia-Marchetti SM 79 trimotor bombers; the raid was broken up by defending Skuas, two of the bombers were shot down and several more damaged, and not a single Italian bomb or torpedo struck. On the same day the first

(continued on page 41)

UNIFORMS, EUROPEAN THEATRE
1: Squadron CO, 1942
2: Telegraphist Air Gunner, 1943
3: Petty Officer Air Mechanic, 1944



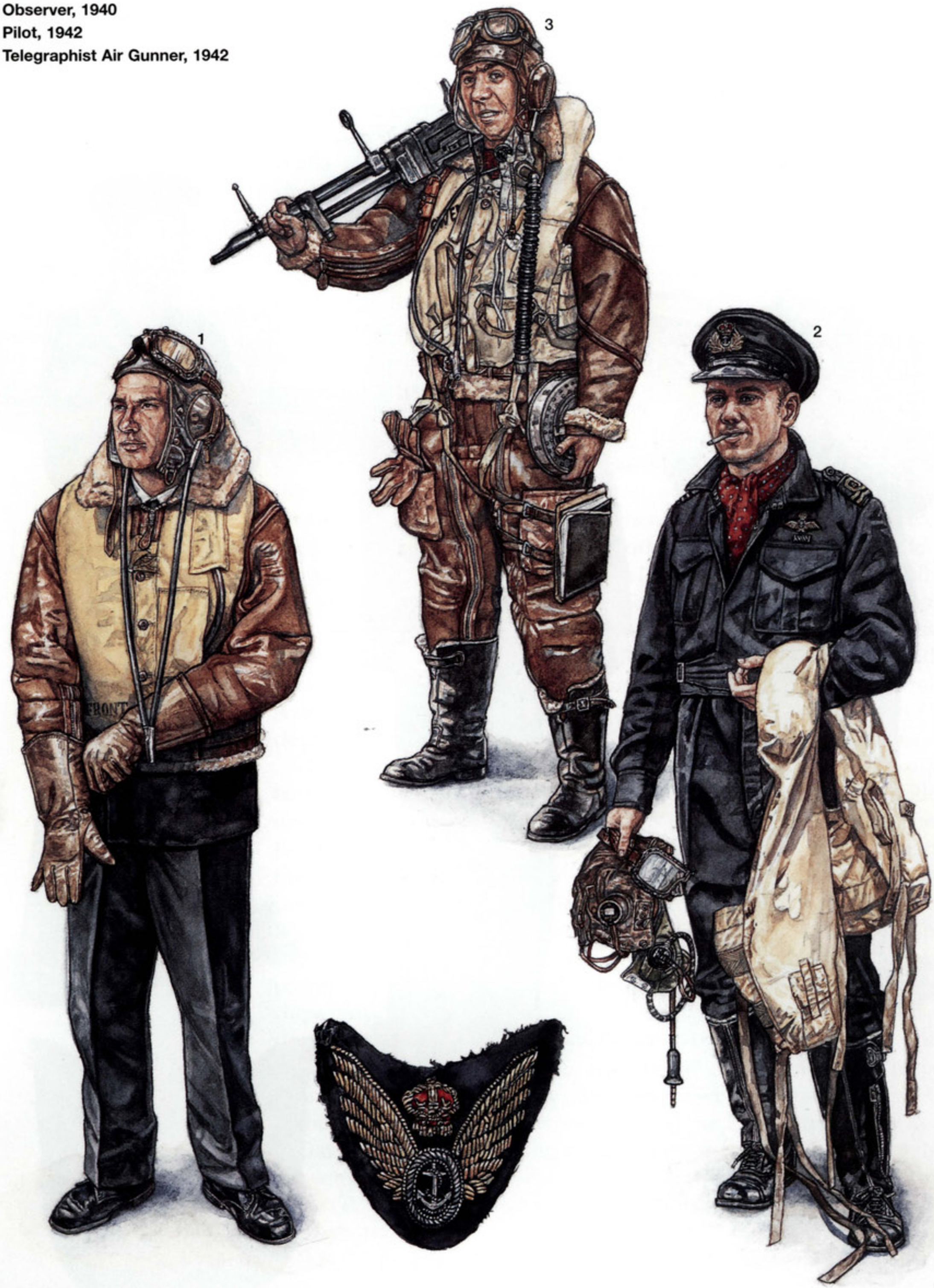
A

AIRCREW FLIGHT CLOTHING

1: Observer, 1940

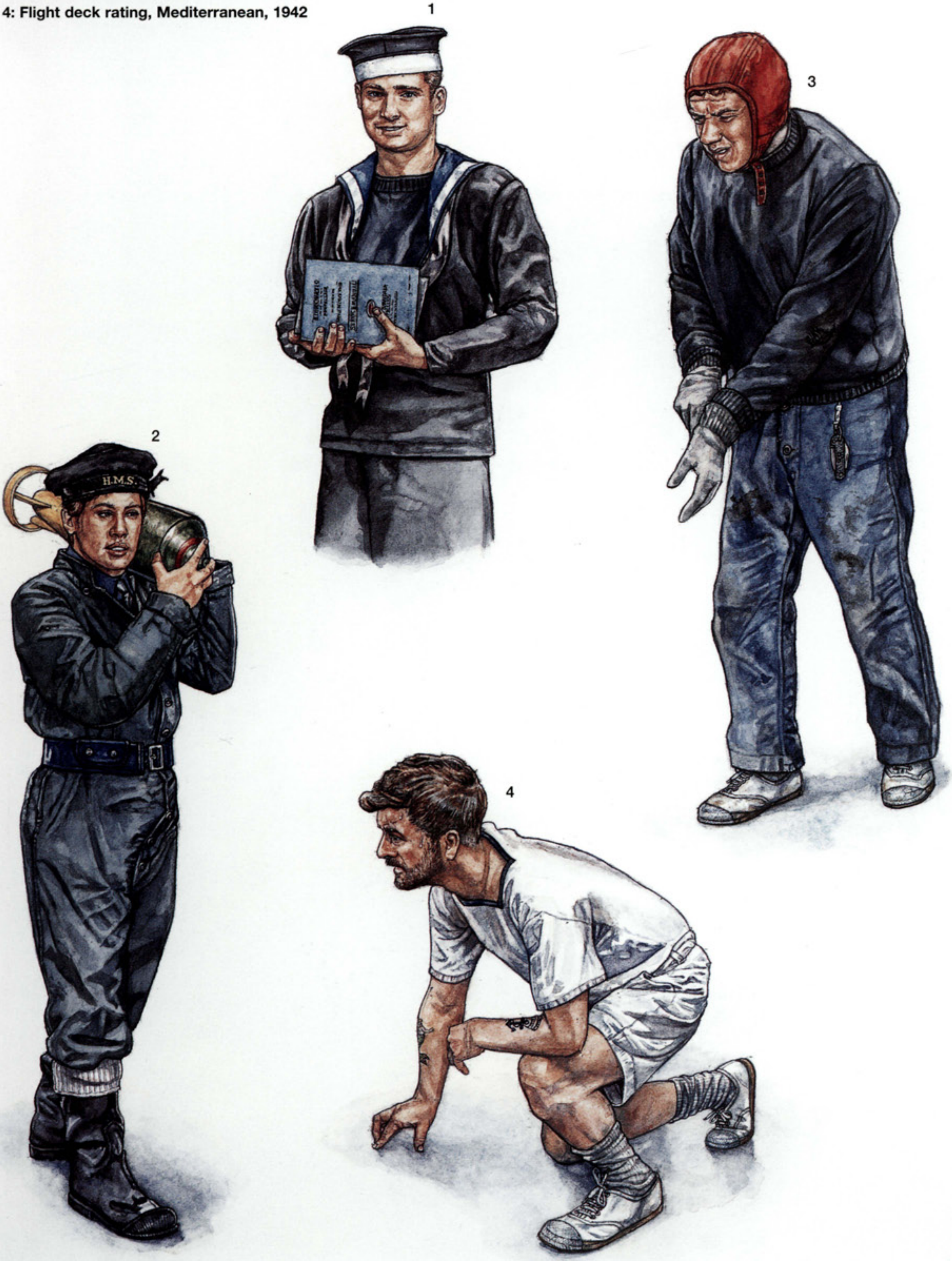
2: Pilot, 1942

3: Telegraphist Air Gunner, 1942



TRAINING & DECK RIG

1: Student pilot, UK, 1943
2: WRNS Air Mechanic, UK, 1944
3: Aircraft handler, northern waters, 1944
4: Flight deck rating, Mediterranean, 1942



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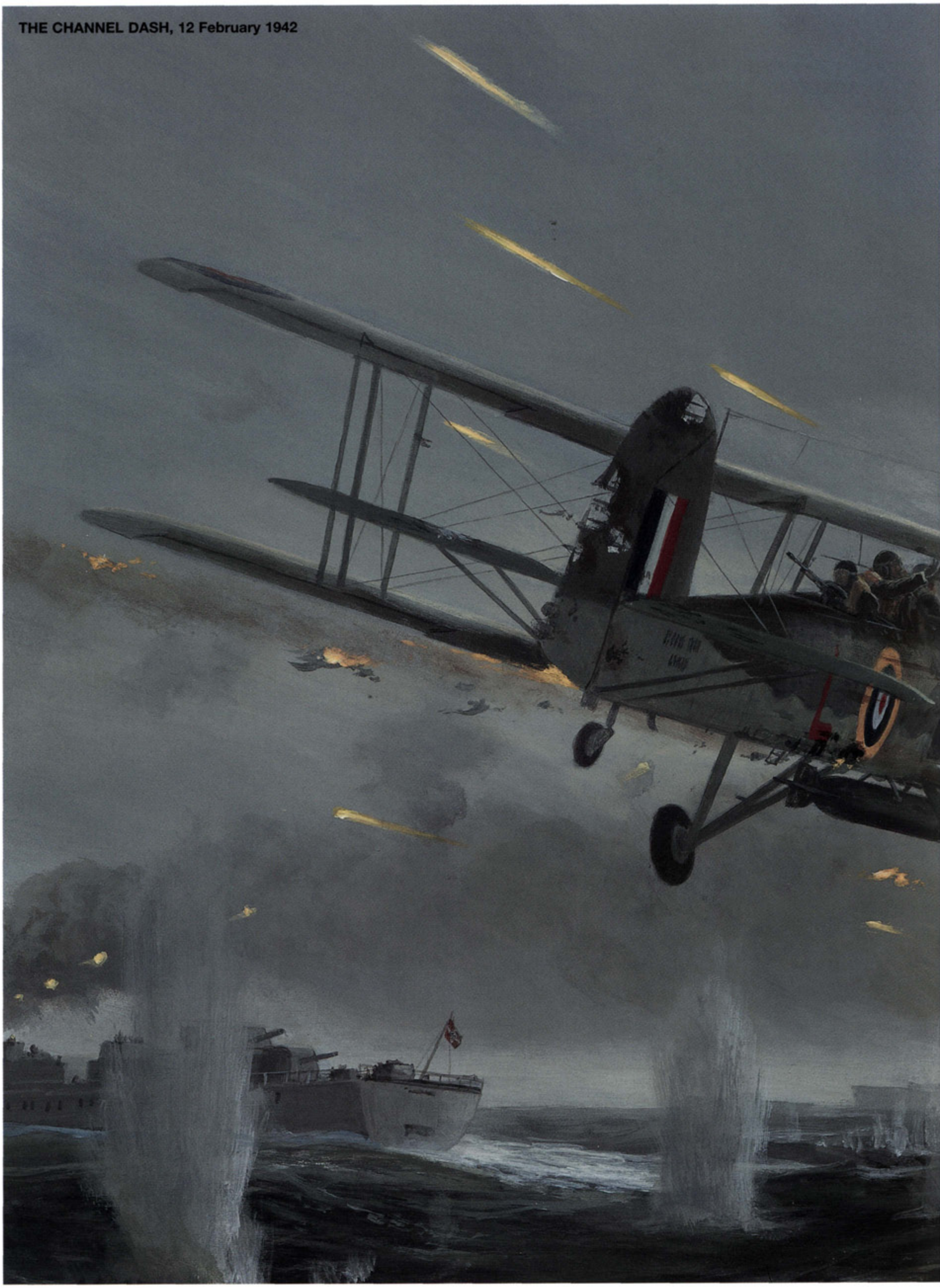
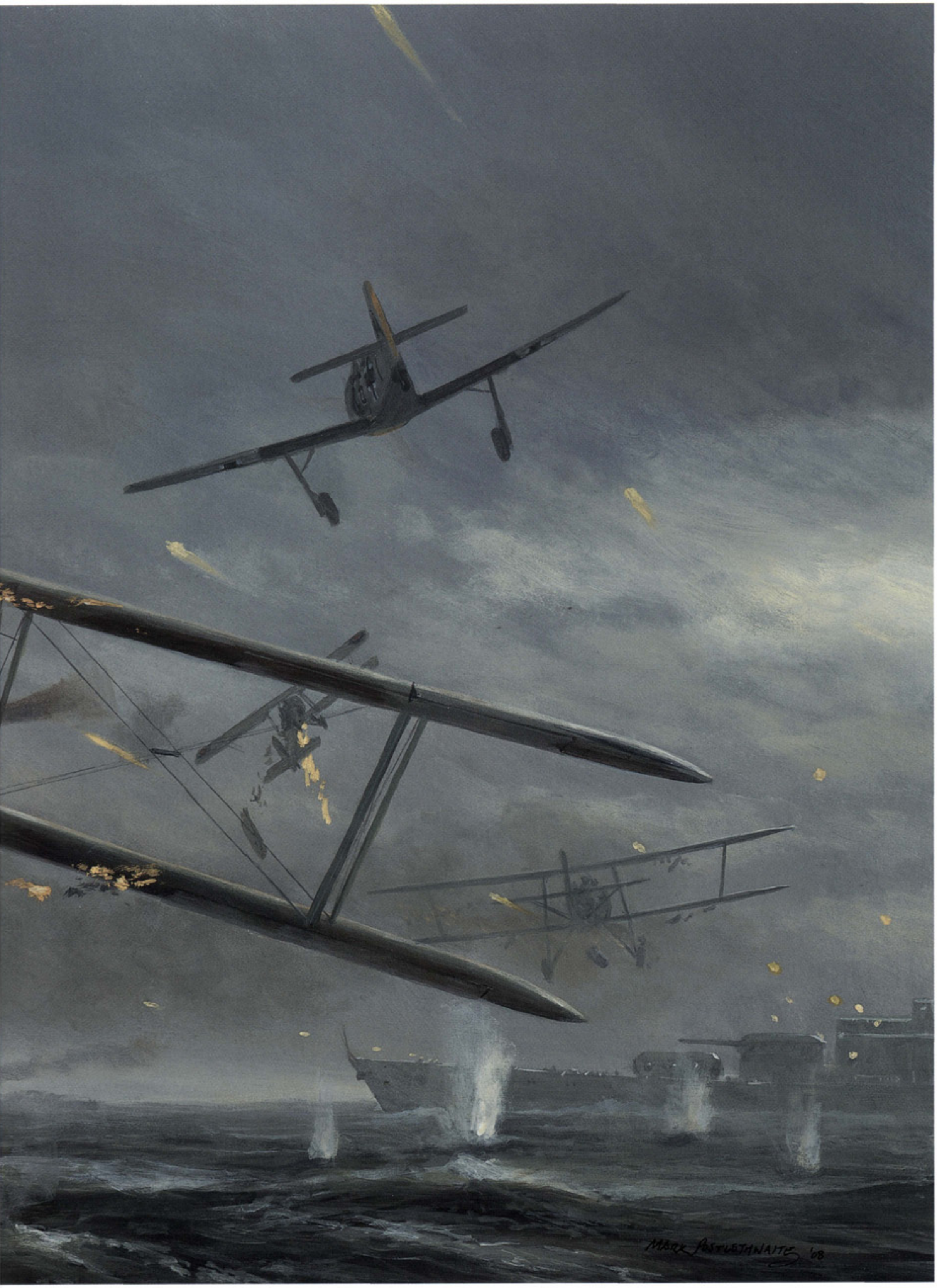
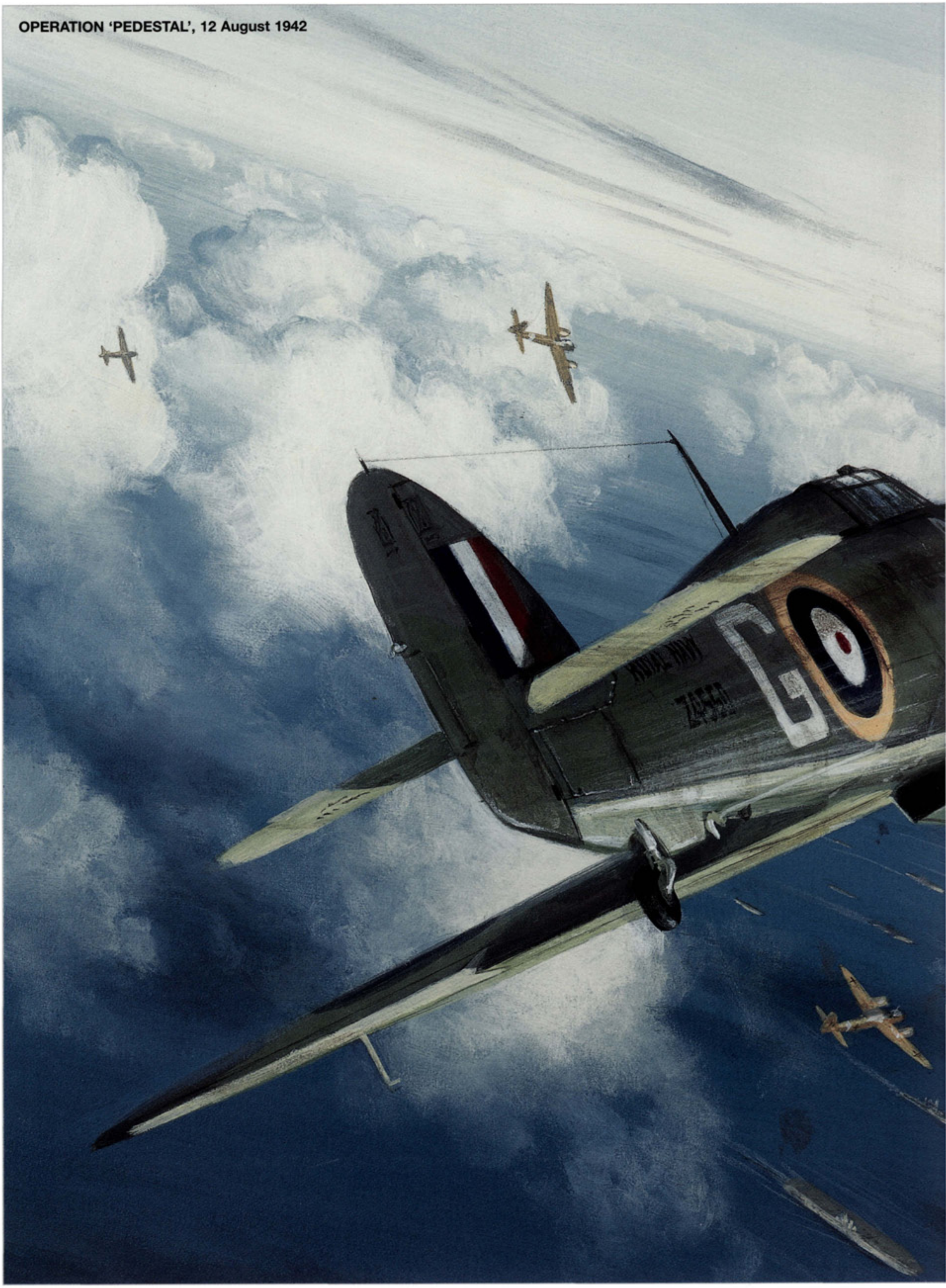

THE CHANNEL DASH, 12 February 1942

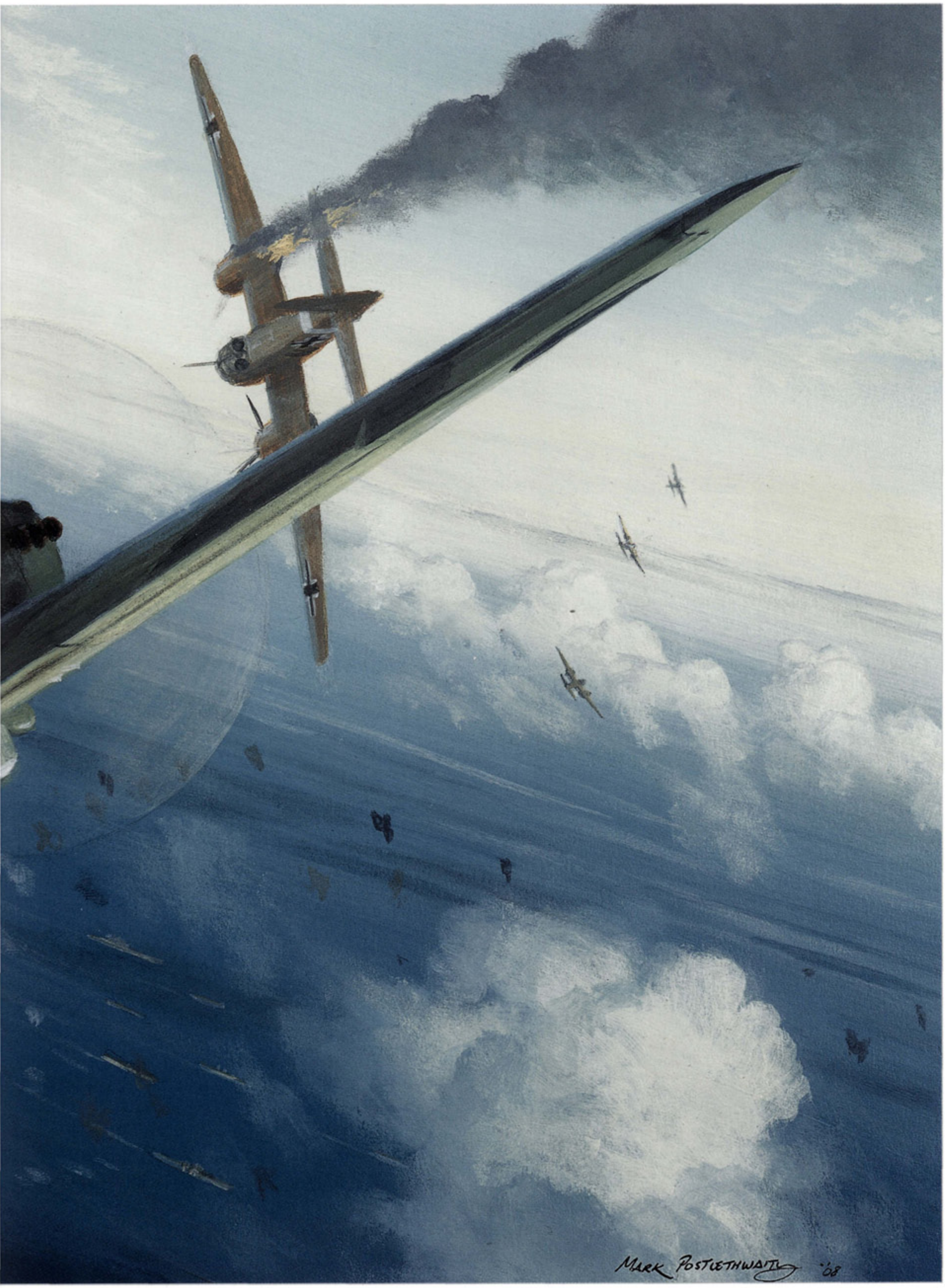
D


Mark Postlethwaite '08

OPERATION 'PEDESTAL', 12 August 1942

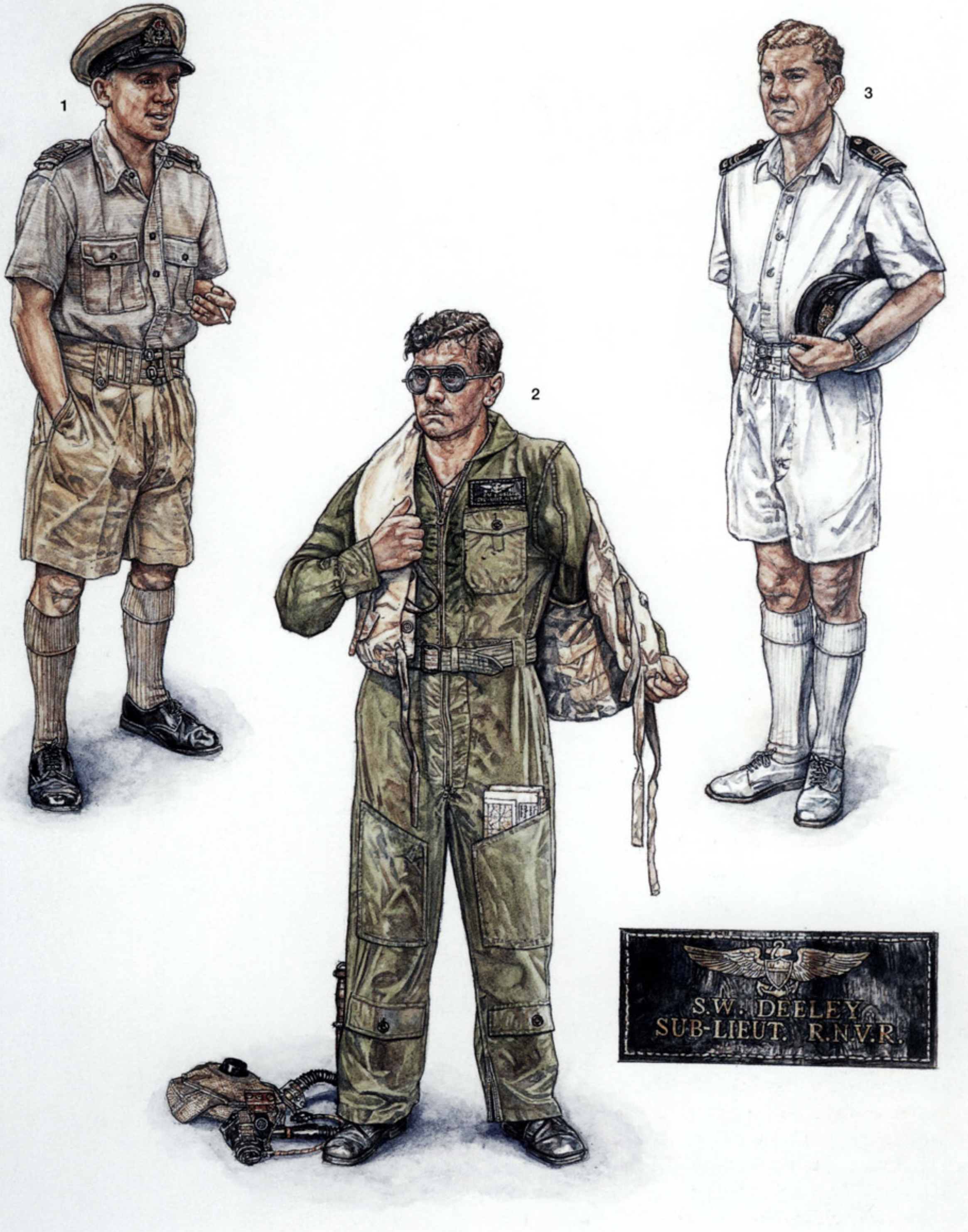

ROYAL NAVY
G

E


MARK POSTLETHWAITE '08

UNIFORMS, BRITISH PACIFIC FLEET, 1945

1: Observer
2: Pilot
3: Squadron CO


1
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S.W. DEELEY
SUB-LIEUT. R.N.V.R.

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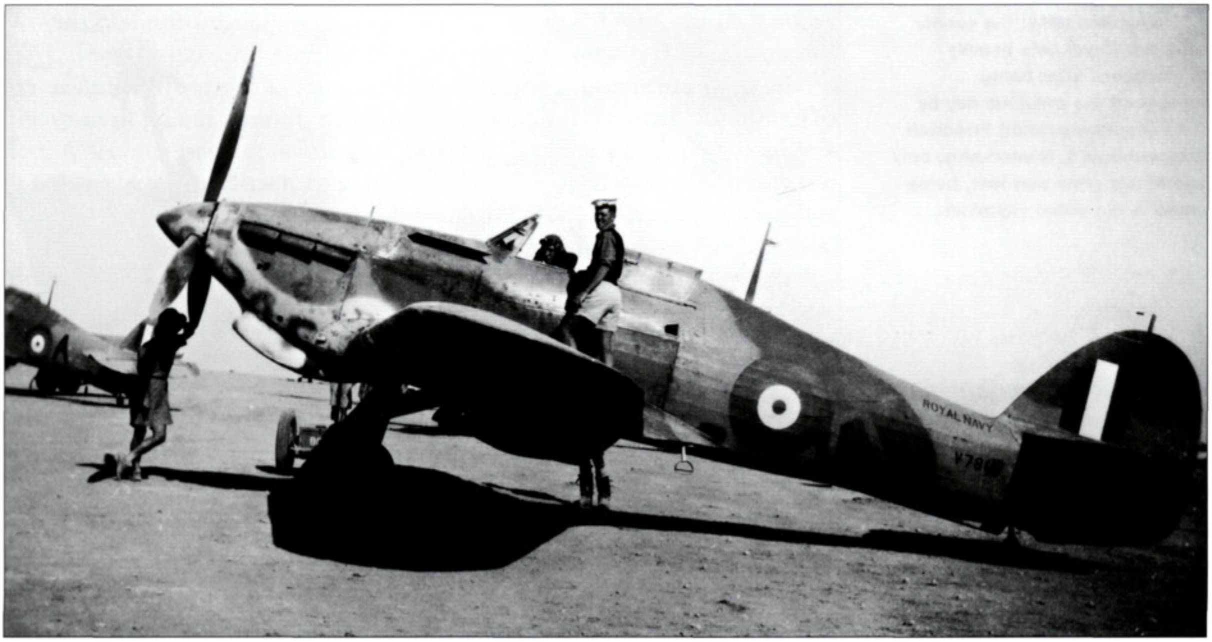


A Hurricane, V7816 'K' of 803 NAS, based ashore in the Western Desert during 1941. 803 came under the operational control of the RAF while based in North Africa, and flew 'un-navalized' Hurricanes on loan from the RAF. This aircraft is fitted with a Vokes air filter to deal with operating in desert conditions.

engagement with the Italian fleet occurred off Calabria; HMS *Eagle*'s Swordfish were used to harass the Italian warships, but the action came to a premature end when HMS *Warspite* scored a direct hit on the Italian battleship *Cesare* and the rest of Italian fleet withdrew.

The Royal Navy's strength in the Mediterranean was significantly bolstered when, on 2 September, the new fleet carrier HMS *Illustrious* arrived in theatre; at 23,000 tonnes and with an armoured flight deck, 'Lusty' was one of the world's most modern carriers. The venerable and inadequate Skua was replaced in the fighter role by the Fairey Fulmar – an eight-gun fighter with a patrol endurance of four hours. While the Fulmar was certainly an improvement over the Skua, it was still hampered by the Admiralty's insistence that naval fighters have an observer to accompany the pilot; the extra weight denied the Fulmar the performance to combat its single-seater opponents. Having two crew members in a biplane, with the drag already caused by a second wing, was not nearly as noticeable as the performance penalty in a streamlined monoplane – a fact which took time to register with the Admiralty.

The Taranto raid

Fleet Air Arm aircraft were involved in raids against enemy shipping and ground targets throughout the summer and autumn of 1940, with fighters employed in attacking Italian bombers and flying boats. However, it was in November that the FAA would prove the importance of naval air power beyond any shadow of doubt. A plan had been hatched as long ago as 1935, by the then Capt Lumley Lyster, to attack the Italian fleet in Taranto harbour using only carrier-borne aircraft. Now a rear admiral, Lyster proposed the plan to Adm A.B. Cunningham, the commander of Force H. The Italians had six battleships and their escorts at Taranto, and although they were clearly unwilling to risk coming out to face the Royal Navy, their mere presence there tied down a number of British warships better employed elsewhere.

14 November 1941: the carrier HMS *Ark Royal* lists heavily to starboard after being torpedoed the previous day by U-81 (Kapitänleutnant Friedrich Guggenberger). Remarkably, only one of her crew was lost, being killed in the initial explosion.

On the night of 11/12 November, 21 Swordfish under the command of LtCdr K. Williamson were launched from *Illustrious* shortly before 9.00pm. The first wave of 12 aircraft, armed with a mixture of torpedoes, bombs and flares, arrived over Taranto some two hours later. The harbour was defended by a dense barrage of flak from ships and shore batteries, and the attackers were further hampered by torpedo nets in the water and barrage balloons suspended above the target. The Swordfish carried out a swift attack, bombing and torpedoing their targets in a little over 20 minutes; Williamson's aircraft was the only Swordfish shot down from the first wave, and he was captured along with his observer. The second wave of nine aircraft suffered a setback when one Swordfish had to abort after suffering problems with its long-range fuel tank. The remaining eight carried out a second strike with bombs and torpedoes, also losing one machine; Lts Bayly and Slaughter were lost with their aircraft. The attack was an unprecedented success: for the loss of two Swordfish, three Italian battleships had been crippled, damage had been inflicted on a heavy cruiser and several destroyers, and a seaplane base and oil storage depot had also been bombed. Just 21 obsolete biplanes had shifted the entire balance of naval power in the Mediterranean.

1941: The Mediterranean

The strategic implications of the Taranto raid were far-reaching, with the Royal Navy able to prowl the Med with even more freedom and several ships now freed to deploy to other theatres of war. However, it was not only in friendly countries that supporters of naval air power drew lessons from Taranto: a year later the Imperial Japanese Navy would emulate it on a vastly larger scale at Pearl Harbor. More immediately, Hitler – exasperated by the repeated failures of his Italian allies – ordered the transfer of Luftwaffe units to the Mediterranean theatre.

This had unfortunate repercussions for the Royal Navy on 10 January 1941, when Italian and German aircraft together attacked *Illustrious* and her accompanying ships. The carrier's escorting Fulmars intercepted the first wave of Italian aircraft, shooting down two and causing the others to flee. A second wave consisting of German Junkers Ju 87 dive-bombers then attacked the carrier; four of these Stukas were shot down, but the impressively skilled German veterans succeeded in scoring six direct hits on *Illustrious*, forcing her to steam for Malta – and ultimately for Norfolk, Virginia – for a refit so extensive that it kept her away from the war for nearly seven months.

On 10 March the second of the *Illustrious*-class carriers, HMS *Formidable*, arrived in the Med with her air group of Fulmars and Albacores, and in less than three weeks she and her aircrews would be involved in a large-scale action against the Italian fleet. Finally giving in to German pressure to engage in offensive operations, the Italians sent out the battleship *Vittorio Veneto* along with escorting cruisers. The Italian warships were sighted south-west of Crete on 27 March, and the Royal Navy's Mediterranean battle fleet of three battleships, *Formidable* and her escorts set sail from Alexandria, Egypt, to engage them. In the action that would be known as the Battle of Cape Matapan, *Formidable*'s aircraft were used to search for and then strike the Italian ships while the surface fleet closed to engage; Fulmars also shot down two enemy aircraft. The *Vittorio Veneto* was attacked by RAF Blenheims operating out of Greece, but remained unscathed. Shortly thereafter, Fulmar fighters strafed the battleship while a strike was carried out by Albacores, who scored a torpedo hit on the *Vittorio Veneto* and forced her to flee from the engagement. A combined force of *Formidable*'s Albacores and Swordfish from Crete's naval air station also attacked and crippled the cruiser *Pola;* Adm Cunningham's surface fleet then closed in, sinking three cruisers and two destroyers for no loss. Cape Matapan proved once again the importance of naval air power, even if available in only limited strength.

However, two months later *Formidable* was also attacked by German Ju 87s and, after suffering two direct hits, was forced to follow her sister ship to Virginia for major repairs. The carrier's fighters joined FAA Hurricanes, Martlets (the British name for the Grumman F4F Wildcat), Swordfish and Albacores ashore in North Africa, to operate from desert airstrips under the control of 201 Group RAF. The naval aircraft carried out anti-shipping and anti-submarine missions, as well as escorting bombers, intercepting enemy aircraft and inserting agents behind enemy lines.

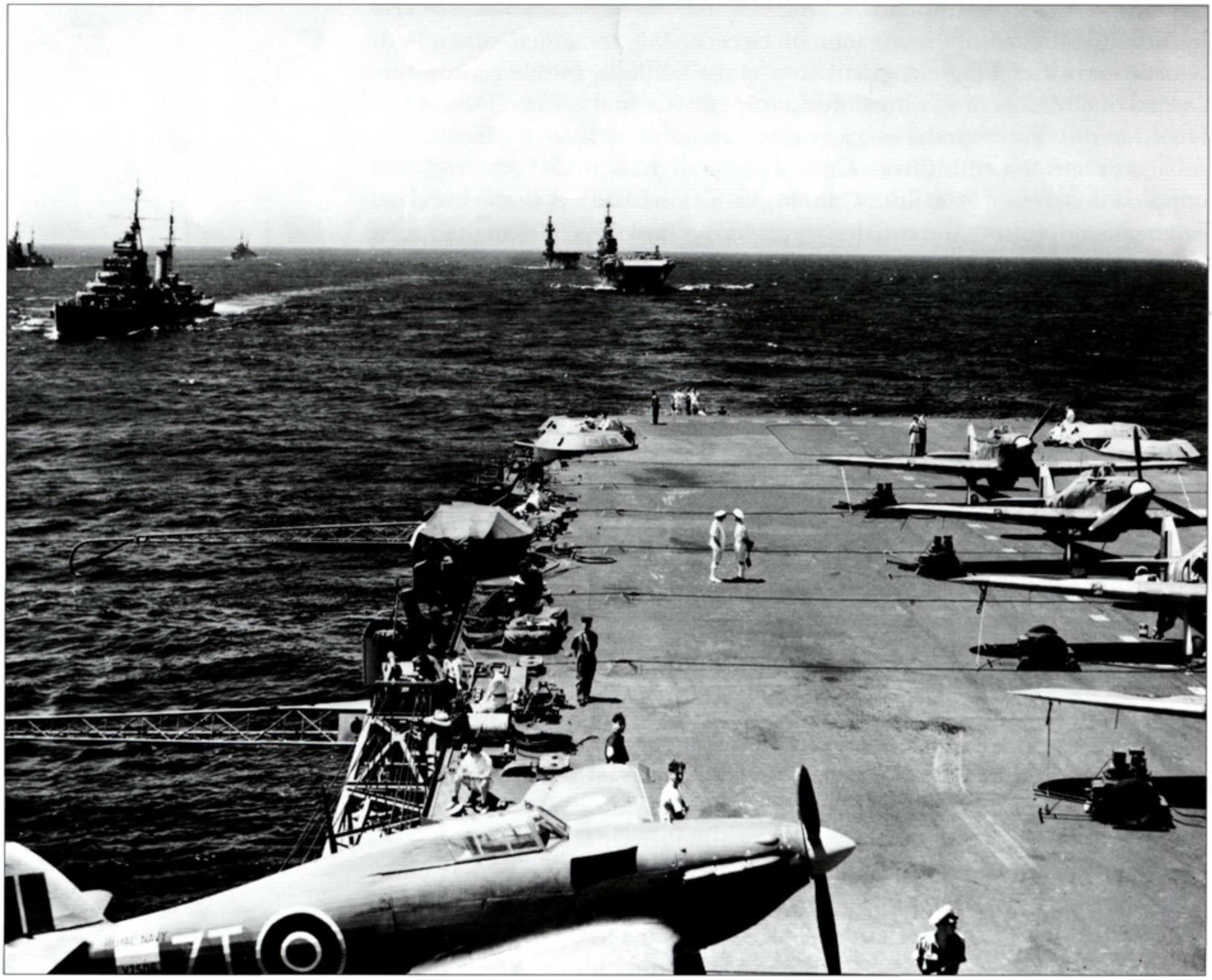
The *Bismarck*

Back in the Atlantic, the German battleship *Bismarck* and the heavy cruiser *Prinz Eugen* took to sea on 18 May 1941 to operate against Allied shipping. After three unsuccessful attempts by the RAF to locate them, a Maryland of 771 NAS ascertained that they had set sail from Norway, and the German capital ships were tracked until they were engaged by the British Home Fleet on 24 May. The battlecruiser HMS *Hood* blew up after a very brief engagement and sank with all but three of her crew, when *Bismarck* put a shell through her deck and into a magazine. This shocking loss prompted Churchill to issue the stark command 'Sink the Bismarck'. Nine Swordfish of 825 NAS launched from the carrier

Victorious and attacked the German battleship; under the command of LtCdr Eugene Esmonde, the Swordfish succeeded in scoring a hit on *Bismarck*. The damaged battleship was tracked for the next two days, and on the evening of 26 May, Esmonde again led his squadron up in bad weather to repeat the attack, this time scoring two direct torpedo hits which locked the battleship's rudder and forced her into one continuous turn – the Swordfish had delivered *Bismarck* to the Home Fleet. After suffering attacks by destroyers throughout the night, *Bismarck* was destroyed the next morning by gunfire from the battleships HMS *Rodney* and *King George V* and torpedoes from escorting cruisers.

Aircraft from HMS *Victorious* would again be involved in a major action in July, following the German invasion of Russia. In a gesture of support for the new allies, the Admiralty sent *Victorious* and *Furious* to launch strikes against the German-occupied Finnish ports of Petsamo and Kirkenes. The result of these raids was disastrous, with 16 aircraft lost to the waiting German fighters and flak, for no return but one cargo vessel sunk, another damaged, and four enemy fighters shot down (impressively) by the outclassed Fulmars. The year drew to a bitter end for the Fleet Air Arm: on 13 November 1941 HMS *Ark Royal* was torpedoed in the Mediterranean by U-81, and sank the next day.

Sea Hurricanes of 885 NAS ranged on the deck of HMS *Victorious* during Operation 'Pedestal', the great Malta convoy of August 1942. Note the external power trolleys connected to their engines, ready to start up. *Indomitable* and the doomed *Eagle* follow in her wake, flanked by some of the carriers' massive escort of cruisers and destroyers.



1942: the 'Channel Dash'

If 1941 ended sourly, 1942 would begin with tragedy. The German battlecruisers *Scharnhorst* and *Gneisenau*, in company with the heavy cruiser *Prinz Eugen*, sailed from the French Atlantic port of Brest on 11 February, bound for Kiel and Wilhelmshaven; all three ships had been damaged by the RAF during 1941 and were in need of repairs. An audacious plan was devised to rush them directly through the narrow waters of the English Channel, rather than sailing north right around the British Isles, within reach of the Home Fleet's main base at Scapa Flow, and down into the North Sea. Sea lanes were swept free of mines and marked; ten destroyers were sent as escorts, many sorties by E-boats were co-ordinated with the capital ships' passage, and the Luftwaffe Inspector of Fighters, the ace Oberst Adolf Galland, planned a rota for airfields in northern France and the Low Countries to provide a permanent umbrella of fighter cover. The plan succeeded; despite intelligence reports suggesting that the flotilla was preparing for sea, the thrust through the narrows took the Royal Navy and RAF by surprise.

The day after receiving his DSO for the attack on the *Bismarck*, LtCdr Esmonde led six Swordfish of 825 NAS into the air from Manston airfield in Kent. He was promised fighter cover from five squadrons of Spitfires, but although he circled at the rendezvous point for as long as possible, only one squadron arrived. With suicidal bravery, the six Swordfish and ten Spitfires faced the withering fire of three large warships, their numerous escorts, and several squadrons of Bf 109Fs and new Focke-Wulf Fw 190As of JG 2 and 26. All six Swordfish pressed home their attack to the last, and all were shot down; only five of the 18 aircrew survived (see Plate D). Eugene Esmonde was not among the five, and was awarded a posthumous Victoria Cross. The Luftwaffe operations diary recorded that the Swordfish were 'piloted by men whose bravery surpasses any other action by either side'. All three of the major Kriegsmarine warships reached German ports safely, though with some damage from mines.[2]

The Malta convoys

The carriers *Illustrious* and *Indomitable* enjoyed more success in the Indian Ocean, flying missions against the Vichy French on Madagascar in May 1942. Swordfish and Albacores carried out numerous strikes on enemy shipping and submarines, escorted by Fulmars, Sea Hurricanes and Martlets. As well as shooting down six Vichy aircraft for no loss, the carrier fighters also carried out strafing missions around Diego Suarez with great success. The Sea Hurricanes of 880 NAS were soon to prove themselves again in August, as part of the defence for Operation 'Pedestal' – the largest and most vital of the Malta convoys.

Since Italy's entry into the war the British foothold on Malta had been of great strategic importance. Half way between Italy and North Africa, the island was an ideal base for both naval forces and land-based aircraft. However, Malta was not capable of self-sufficiency, and as well as the military assets to defend the island even food had to be shipped in from outside to keep the population alive. A steady stream of heavily escorted convoys to Malta was therefore a priority for the Royal Navy, and the island suffered so many attacks from German and Italian bombers that a constant supply of RAF fighters and pilots was also necessary.

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[2] For fuller details of the planning and execution of the German operations, see David Baker, *Adolf Galland: The Authorised Biography* (Windrow & Greene, 1996)

Operational 'Pedestal' was built around the carriers HMS *Eagle, Furious, Indomitable* and *Victorious* and the battleships *Nelson* and *Rodney;* also in company were no fewer than seven cruisers and 27 destroyers, defending just 14 merchant vessels. A combined fighter force of 68 Sea Hurricanes, Fulmars and Martlets would defend the convoy and its escorting fleet from enemy aircraft, while 20 Albacores would be employed on anti-submarine patrols. Meanwhile *Furious* carried 42 RAF Spitfires destined to join Malta's defence.

On 11 August 1942, shortly after passing Gibraltar, *Eagle* was hit by four torpedoes fired by U-73 (KL Helmut Rosenbaum) and sank in six minutes; five of her 801 NAS Sea Hurricanes, airborne at the time, managed to land on *Indomitable* and *Victorious.* Over the next four days a relentless onslaught of German and Italian aircraft continuously attacked the convoy, sometimes in raids numbering over 100 aircraft. Time and again the fighters of the Fleet Air Arm would scramble to intercept them, breaking up the raids often before they even reached the AA guns of the escorts (see Plate E). Nevertheless, the convoy was battered by bombers and E-boats; nine of the merchant vessels, two cruisers and a destroyer were lost, and both *Indomitable* and *Victorious* were damaged. The FAA succeeded in shooting down 39 enemy aircraft and sinking two Italian submarines; on 12 August Lt R.J. Cork, a veteran of the Battle of Britain and the Diego Suarez operation, personally shot down five aircraft during 24 hours. Whilst the convoy suffered heavy damage, the elements which did reach Malta were of vital importance, and there can be little doubt that the island would have fallen without the efforts of the sailors and airmen throughout Operation 'Pedestal'.

Operation 'Torch'

The winter of 1942/43 saw a great turn in the tide of war in favour of the Allies in both Russia and the Mediterranean. As the German Sixth Army fought for its life at Stalingrad, a combined Anglo-American invasion of French Morocco and Algeria was planned to open up a second front in North Africa. This Operation 'Torch' involved landing more than 100,000 troops from three separate task forces, in the face of an unpredictable degree of resistance from the Vichy French forces. Four Royal Navy fleet carriers and two lighter escort carriers operated more than 170 aircraft from 20 FAA squadrons in support of the landings. Alongside the Martlet, Fulmar, Sea Hurricane and Albacore, the Seafire now joined the ranks of the Fleet Air Arm – a navalized version of the RAF's Spitfire, adapted for carrier operations. During this operation many Royal Naval aircraft were painted with American markings – not only to avoid 'friendly fire' from inexperienced US gunners, but also because it was thought that the French would be less likely to fire upon American aircraft.

The landings began on 8 November, with fighter sweeps by Seafires and Sea Hurricanes accounting for eight enemy aircraft. Albacores attacked airfields at Oran, destroying 47 French aircraft on the ground for the loss of four of their own. Martlets of 882 NAS were tasked with patrolling the French airfield at Blida; the first section to arrive attacked two aircraft attempting to take off, but the most remarkable episode was

This Martlet, 'Z' of 805 NAS, was photographed at Gambut, Libya – one of several bases in North Africa from which the squadron operated during 1941 and 1942. The Martlet was the British name for the American Grumman F4F Wildcat – a robust and reliable fighter, if somewhat mediocre in performance by the standards of late 1942.

yet to come. Lieutenant B.H.C. Nation led the second section of four Martlets to Blida, only to find that he was being signalled from the ground. After communicating with *Victorious*, Nation was ordered to land – and the entire airbase surrendered to a single pilot armed with a revolver. Although a costly six-month campaign followed before the final Axis surrender in North Africa, Operation 'Torch' gave the Allies a firm foothold from which to advance and eventually inflict a defeat as costly as that at Stalingrad.

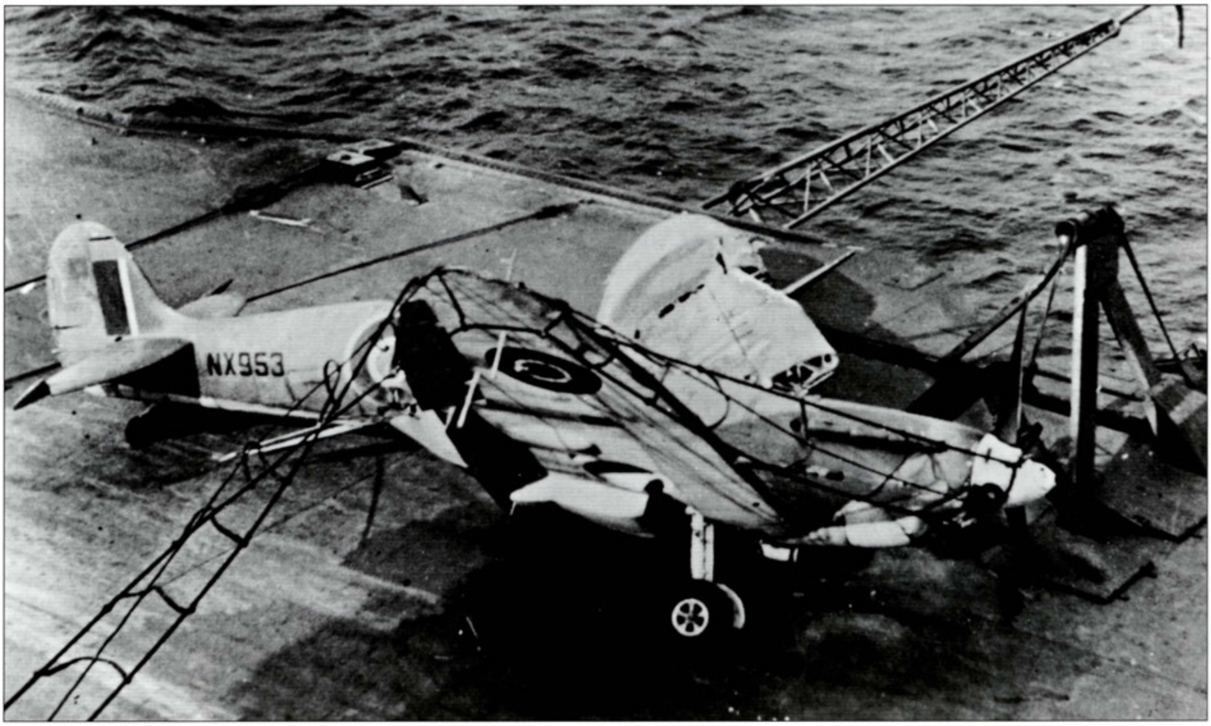
Sicily and Italy

The subsequent Allied landings in Sicily would provide a platform for a full-scale offensive up through Italy, taking the first of the Axis nations more or less out of the war and freeing up the Mediterranean for convoys through the Suez Canal to the Far East. *Indomitable* and *Formidable* provided Seafires and Martlets to cover the landings of 180,000 Allied soldiers in Sicily on 10 July; however, the great majority of the 3,700 Allied aircraft involved in Operation 'Husky' were land-based, and anyway very little resistance was encountered in the air. Even with an invading army on their very doorstep the Italian fleet again refused to engage the Allies, but a lone German Ju 88 did manage to carry out a torpedo attack on *Indomitable.* Having just returned to action from the repair of damage sustained during Operation 'Pedestal', the unlucky *Indomitable* was now hit again, badly enough to keep her in harbour for another year.

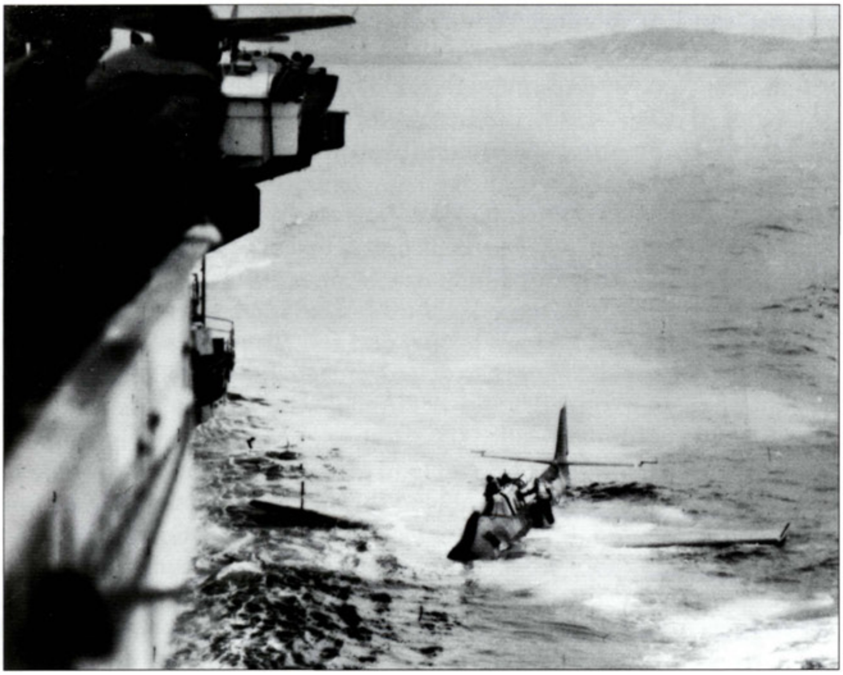
The British landings in Calabria on 3 September were covered by land-based aircraft. Although Mussolini was deposed and Italy agreed to an armistice that same day, German forces in Italy reacted energetically. Further Anglo-American landings followed at Salerno on 9 September – Operation 'Avalanche' – at the same time as an airborne assault on Taranto. Fighter cover would be problematic for the Salerno operation; since land-based Spitfires only had the fuel capacity for 20 minutes over the beaches, carrier air support was the only option. This was provided by Force V's light carriers HMS *Unicorn, Attacker, Battler, Hunter* and *Stalker*, while Force H's fleet carriers *Illustrious* and *Formidable* covered Force V itself. In all, 106 Seafires were embarked on the Force V carriers, with Force H providing a mixed force of Seafires, Martlets, Albacores and the new Barracuda torpedo/dive-bombers.

Although the Fleet Air Arm intercepted and broke up several raids on 9 September, and the Luftwaffe inflicted very little damage, no enemy aircraft were destroyed. Despite this 'target-poor environment', however, a combination of light winds, poor visibility and the sheer fragility of the Seafire – whose narow undercarriage, in particular, was far too weak for deck landings – resulted in 40 Seafires being taken out of action on that first day. Force V's work rate continued to be admirably high nonetheless; the carriers accepted a loss of only 12 per cent of planned sorties the next day even though some 40 per cent of their aircraft were now unserviceable. The events of 10 September were much the same, with enemy raids being intercepted but deck landing accidents continuing; LtCdr W.C. Simpson, CO of 897 NAS, shot down two Bf 109s in a single engagement. A valiant resistance by German ground forces had delayed the entire action, but Montecorvino airfield had been bombed into submission by the end of the second day. The third day's patrols saw Force V reduced to 39 Seafires, which exceeded expectations by carrying out 160 sorties during 11 September. Seafires went on to operate from airstrips on the Italian mainland until they could be relieved by RAF fighters. One sweep from the land-based Seafires saw British fighters attacked by American aircraft in the thick haze; one US fighter was shot down by Seafires, but the pilot baled out unharmed. By 14 September, the last day of embarked air support, Force V had just 30 fighters remaining. The ferocity of the German resistance had taken the Allies by surprise but – the appalling rate of deck landing incidents not withstanding – Operation 'Avalanche' could be classed as a success, if a close-run one.

The employment of light escort carriers off Salerno was partly made possible by the décisive tipping of the balance in the Allies' favour in the



The Supermarine Seafire was perhaps the Fleet Air Arm's best air-to-air dog-fighter, but it was too fragile for the demands placed upon it by carrier operations. Seafire NX953, flown by S/Lt R.D. Wood of 809 NAS, was written off on 31 July 1943 after missing the wires and hitting the barrier on HMS *Unicorn*. This was one of the four light carriers of Force V that would cover the Salerno landings in Operation 'Avalanche' during the second week of September 1943; in six days 76 from the starting strength of 106 Seafires would be lost, the great majority of them to deck landing accidents.



As well as boasting impressive range and durability, the American Grumman TBM Avenger torpedo-bomber also had enviable ditching characteristics. They are demonstrated by this aircraft of 846 NAS from HMS *Trumpeter* during the series of raids on the *Tirpitz* in Norwegian waters in late August 1944: all four of its aircrew survived.

Battle of the Atlantic since May 1943. Throughout the long and desperate convoy war FAA aircraft had been used to intercept German patrol aircraft and engage U-boats, protecting the vital convoys both from America and through the Arctic circle to Russia. Strike and fighter aircraft alike had operated from the relatively tiny decks of the escort carriers, and from the even smaller 'merchant armed carriers', many of which were simply civilian liners with a flight deck built on to them.

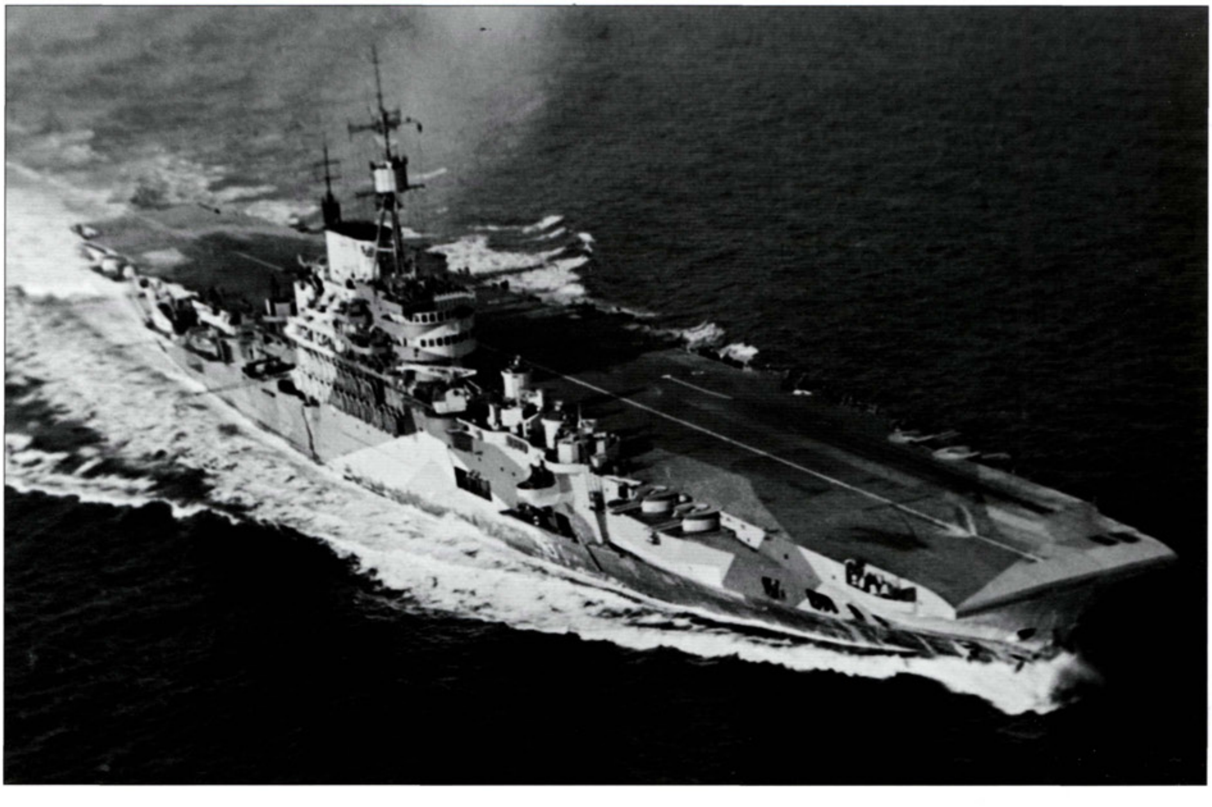
Victorious in the Far East

While the Royal Navy continued to confront the Germans and Italians in the European and Mediterranean theatres of war, in the Far East the US Navy was locked in conflict against the Japanese. In May 1943 the British fleet carrier HMS *Victorious* was loaned to the US Navy, joining company with the carrier USS *Saratoga* and taking part in covering the landings in New Georgia during that summer. *Victorious* operated US-built Wildcats (Martlets) and TBM Avenger torpedo-bombers, allowing both carriers' aircraft to be operated from each others' decks at need. Her Royal Navy crew wore US Navy uniform with British insignia, and her aircraft flew in US colours. This combination of British and American carrier air power was the forerunner of a more substantial RN contribution to the final defeat of the Japanese over the next two years.

1944: the *Tirpitz*

Considering the sheer strength of the force required to destroy the *Bismarck*, it is unsurprising that the Admiralty was so concerned by the potential of her sister-ship the *Tirpitz*. The 53,500-tonne battleship had only once fired her guns in anger, at Allied shore installations on Spitzbergen Island in September 1943; nevertheless, her mere presence in Norwegian waters demanded the precautionary attention of many British assets. Attacks had been attempted by both *Victorious*'s strike aircraft and RAF Bomber Command, with little success – indeed, the only successful attack was conducted by six RN midget submarines, which inflicted serious enough damage on *Tirpitz* while she was anchored in Altenfjord to put her out of action for six months.

The Fleet Air Arm became seriously involved in the *Tirpitz* story on 3 April 1944, when a strike was launched from *Victorious* and three accompanying escort carriers – HMS *Emperor, Pursuer* and *Searcher*. In all, 40 Barracudas escorted by 79 US-supplied Corsairs, Hellcats and Martlets attacked the battleship in two waves, scoring hits with 13 bombs; for the loss of three Barracudas the FAA inflicted severe damage and killed 122 of *Tirpitz*'s crew. While several follow-up raids were planned and launched, the next attack to actually reach *Tirpitz* would not be until 17 July, when 44 Barracudas and 12 Fireflies were escorted by 35 Hellcats and Corsairs. Although, once again, there were no German fighters present, observation posts were able to give *Tirpitz* advanced warning of the raid and the battleship was able to shroud herself in smoke; only one near miss was scored, for the loss of a Barracuda and a Corsair. Between 22 and 29 August four further raids were carried out by the aircraft of *Indefatigable, Formidable, Furious, Nabob* and *Trumpeter*. These met with varying success, the closest call for *Tirpitz* being when one bomb crashed through eight of her decks but failed to explode. Eleven aircraft were lost over the four raids; while extensive damage was inflicted, it took three further raids from Lancasters of RAF Bomber Command to finally destroy the battleship in November 1944. Throughout this period, FAA aircraft were also involved in attacking German shipping and coastal targets in Norway on an almost daily basis.



HMS *Indefatigable* was commissioned on 3 May 1944. She was first deployed operationally to Norway on the *Tirpitz* raids, but enjoyed much more success as part of the British Pacific Fleet. Serving with Task Force 57 off Okinawa, she suffered a direct hit from a *kamikaze* aircraft on 1 April 1945 but, thanks to her armoured flight deck, was operating aircraft again after only 5 hours. One American observer aboard *Indefatigable* was prompted to remark: 'When a kamikaze hits a US carrier, it's six months repair at Pearl. In a Limey carrier, it's a case of "Sweepers, man your brooms."'

The Normandy landings

The main offensive to liberate NW Europe began on 6 June 1944. Since April, FAA Seafires, Spitfires and Hellcats had been employed in escorting RAF Typhoons on strike sorties over northern France. These same aircraft began their involvement in Operation 'Neptune' – Adm Bertram Ramsay's brilliantly planned and conducted naval phase of Operation 'Overlord' on D-Day – by spotting for the guns of battleships during preliminary shore bombardments. The superiority of the Seafire in air-to-air combat was demonstrated on 7 June by LtCdr S.L. Devonald, who alone fought eight Fw 190s to a stalemate. While the Fw 190s proved a clear threat to the Seafires, several of the more elderly Bf 109s fell to the naval fighters' guns. Seafires were also involved in escorting transport aircraft to Normandy, and striking at German midget submarines threatening the Normandy beachhead.

Operation 'Dragoon'

In August the Normandy invasion was backed up further by Operation 'Dragoon', the Allied landings in southern France. Seven British and two American escort carriers provided cover to the amphibious landings between 15 and 24 August 1944. Seafires, Martlets and Hellcats were employed in Combat Air Patrols over the fleet, although the few remaining Luftwaffe aircraft in those skies were dealt with by the RAF and USAAF. The FAA fighters were therefore used to strike military targets and infrastructure inshore, including destroying German aircraft on the ground during airfield raids. With ideal flying conditions the Seafire gave a magnificent account of itself, dispelling many of the myths concerning its performance following Operation 'Avalanche'.

Once ground forces and land-based aircraft were firmly established, the British carriers moved to the Aegean to attack enemy shipping and carry out further strikes on German forces based on the Greek islands, before covering the Allied landings on the Greek mainland in October.

1944–45: the British Pacific Fleet

Royal Navy carrier operations against the Japanese were stepped up in April 1944, when Adm Somerville's Eastern Fleet carried out strikes against Japanese facilities on the island of Sumatra; Corsairs and Barracudas from HMS *Illustrious* joined the USS *Saratoga*'s aircraft in attacking Sabang's harbour and storage facilities. After a strike on Port Blair in the Andaman Islands in June, *Illustrious* was joined by *Victorious*, and a second raid on Sabang was undertaken. *Indomitable* relieved *Illustrious* in August, and immediately made her presence felt by launching raids on Java. Three months later Adm Sir Bruce Fraser took command of the redesignated British Pacific Fleet, including the three carriers already on station and the newly arrived HMS *Indefatigable*. By the end of the year a series of strikes against Japanese oil refineries in Sumatra was under way.

These operations were ramped up in January 1945 when the FAA undertook its largest action of the entire war: three strikes would be flown between 24 and 29 January against the Palembang oil refineries in south-east Sumatra. These were the two largest oil refineries available to the Japanese, at a time when their fuel was in critically short supply; Palembang alone could provide two-thirds of the oil needed for aviation fuel for the entire Japanese war effort. All four carriers of the British Pacific Fleet were involved in the operation, and worked up with practice strikes along the coast of Ceylon.

At 6.15am on 24 January the first strike was launched against the refineries at Pladjoe, by 65 Avengers escorted by Hellcats and Corsairs, with Fireflies in support. Royal Navy Corsairs would also attack Japanese airfields in the area, and Hellcats would carry out photographic reconnaissance, while Seafires, Corsairs and Hellcats would fly Combat Air Patrols over the carriers; in all, more than 240 aircraft were committed to the operation. The raid was attacked by Japanese fighters and heavy flak en route for the target, and was further hampered by a series of rapidly deployed barrage balloons over the refineries. The fighter escorts were kept busy by waves of Japanese fighters, which showed how unfortunately ineffective the concurrent airfield strikes had proved to be. Nine FAA aircraft were lost on the first raid, but massive damage was inflicted on the oil refineries.

A second raid against Soengei Gerong refineries was launched on 29 January. Again, Japanese fighters managed to avoid the preparatory airfield attacks and intercept the raid, but struggled to cut through the fighter escort. This raid met with similar success; both refineries were disabled for months and would not reach full output again until after the war. Sixteen British aircraft were shot down by fighters or destroyed by collisions with barrage balloons, and unfortunately nine FAA aircrew were captured after baling out; but the fighter escort shot down 30 Japanese aircraft, four more fell to Seafires defending the carriers, and a further 38 were destroyed on the ground.

Okinawa

The British Pacific Fleet now moved to Australian ports in preparation for the operations against Okinawa – Operation 'Iceberg', a necessary precursor to the planned invasion of Japan itself. (The escort carriers left in the Indian Ocean were still kept busy until the end of the war, however, taking part in covering the landings at Rangoon on 2 May 1945, and launching operations over Sumatra, the Nicobars and the Andamans over the next two months.) The British Pacific Fleet was now designated Task Force 57 for operations with the American Fifth Fleet under Adm Spruance; it sailed for Okinawa on 25 March 1945 with four carriers, two battleships, four cruisers and 11 destroyers. Task Force 57

Despite its superficially similar appearance to its predecessor, the Fulmar, the Fairey Firefly was a considerable improvement, with a Rolls Royce Griffon engine giving it a top speed of 319mph. The Firefly was armed with four 20mm cannon and provision for eight 60lb rockets or two 1,000lb bombs, giving it a formidable punch for ground-attack missions against Japanese targets in 1945. This is a Mk I, 'Z8M' of 790 NAS at RNAS Yeovilton – the squadron that assisted in the training of Fighter Direction Officers.

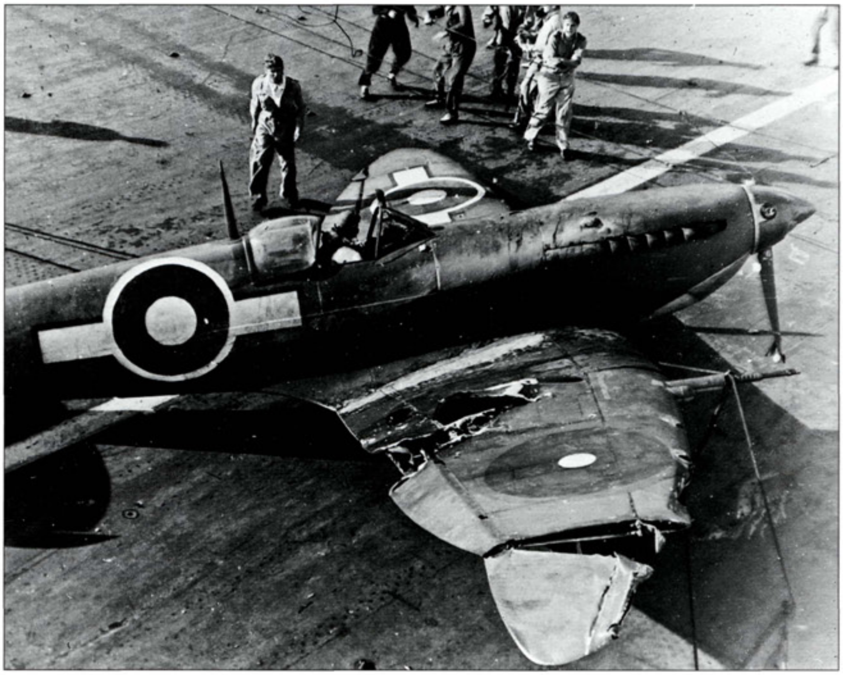
Another highly successful naval aircraft from Grumman was the F6F Hellcat, which replaced the Wildcat/Martlet; it had a greater range and top speed, better manoeuvrability, and was also more forgiving of carrier landings thanks to its wider undercarriage and good visibility. These are Hellcats of 800 NAS from RNAS Eglinton, probably in 1943; the type saw FAA combat service from early 1944, in Norwegian waters, over NW Europe and with the British Pacific Fleet.

was stationed off the Sakishima Gunto, a series of islands between Formosa and Okinawa itself. The US Task Force 58, centred on 16 light carriers with more than 1,200 aircraft, secured the northern approaches to Okinawa while the 15 escort carriers of Task Force 52 provided close air support for the US landings. The smaller British task force had the mission of denying access to the landing forces from the Japanese airfields on Sakishima Gunto. Avengers flew day after day to bomb the runways, since these were often repaired again overnight. Hellcats and Corsairs flew escort while Fireflies carried out rocket-strike sorties, and the shorter-ranged Seafires flew defensive patrols over the carriers. While the deadly *kamikazes* had been encountered before, April 1945 saw these suicide attacks carried out on an unprecedented scale. While the Japanese suicide bombers still posed a severe threat to the British carriers, their armoured flight decks made these less vulnerable than the American carriers with their wooden decks.

By 23 April, when Task Force 57 arrived at San Pedro Bay for a brief interlude from the fighting, the FAA aircrews had dropped over 400 tons of bombs during 2,444 strike sorties, denying the Japanese vital reinforcements with which to attack the American invasion force; 33 Japanese aircraft had been destroyed in air-to-air combat, with a further 12 destroyed on the ground. The Fleet Air Arm had lost 47 aircraft to a combination of enemy action, unserviceability and accidents, with 29 aircrew lost. Task Force 57 sailed again on 1 May, flying a further 2,449 strike sorties over the following month. By the end of Operation 'Iceberg II' all of the British carriers had been damaged by kamikazes, and 93 per cent of their aircraft had been lost. Although Allied losses were severe, Okinawa fell to US forces on 2 July.

Reinforced by the new carrier HMS *Implacable*, the fleet could now provide strike sorties with Seafire escorts fitted with modified US drop tanks. Seafires joined the Fireflies in escorting Avengers to bomb and strafe targets on the Japanese-held island of Truk in the Carolines on 14 and 15 June.

Suffering severe damage from Japanese flak over Okinawa in April 1945, this Seafire LIII of 894 NAS has managed to recover safely to HMS *Indefatigable*. While criticized for its lack of suitability for carrier operations, the Seafire was clearly still able to sustain more damage than it is often given credit for.



Japan

Once again redesignated, the British Task Force 37 sailed under the command of US Third Fleet on 28 June. The Third Fleet's 15 carriers, seven battleships and their escorts were split into three Task Groups, and on 16 July, with Task Force 37, they arrived 300 miles off the coast of their final target: the Japanese home islands. The next day Corsairs and Fireflies from HMS *Formidable* and *Implacable* became the first British aircraft to carry out attacks on the Japanese mainland, bombing, strafing and rocketing land installations and coastal shipping. However, the British were largely excluded from the mainly American operation of decimating the remainder of the Japanese war machine; Adm Halsey later admitted that this was a very deliberate decision – it was felt that revenge for Pearl Harbor should be a solely American operation. British carrier aircraft were still involved in attacks against mainland Japan and shipping throughout the operation, however, including a series of strikes which crippled the Japanese carrier *Kaiyo* on 24 July.

In the event, the certainly enormous cost of an Allied invasion of Japan did not have to be paid: on 7 August a B-29 bomber dropped the first atomic bomb on Hiroshima, and a second bomb was dropped on Nagasaki two days later. This made the Fleet Air Arm's second Victoria Cross of the war (once again, a posthumous award) all the more poignant, in that the war had already been won. On 9 August Lt R.H. Gray, the Senior Pilot of 1841 NAS, led eight Corsairs on an anti-shipping sortie in Onagawa Wan Bay. Braving the fire of five warships and heavy coastal flak, Gray remained at the controls of his burning Corsair even though wounded himself, long enough to score a direct hit on a destroyer with his 1,000lb bomb. The destroyer sank almost immediately, but Gray's Corsair crashed into the harbour.

With no sign of an imminent surrender from Japan, strikes were launched continuously from the US and British fleets. On 15 August

Indefatigable launched her Fireflies to attack targets south of Tokyo, with a second sortie of six Avengers launched shortly afterwards. The Avengers, escorted by eight Seafires from 887 and 894 NAS, were attacked by a force of about 15 Japanese Zero fighters. In a display that would prove the unmatched dog-fighting prowess of the Seafire once and for all, eight Zeros were confirmed as kills, with a further four probables, in exchange for one Seafire and one Avenger. In the first pass S/Lt F. Hockley's Seafire was shot down; he managed to bale out, but was handed over to an IJA garrison upon landing and was murdered by three Japanese officers.

By the time *Indefatigable* had recovered her aircraft, World War II was over. Appropriately, just as the Fleet Air Arm had shot down the first Axis aircraft of the war to fall to British guns in September 1939, they had also closed the scorecard six years later. The Fleet Air Arm had grown from its embryonic state in 1939 to ending the war with more than 3,700 aircraft, 59 aircraft carriers, 56 air stations all over the world, and 72,000 officers and ratings. More importantly, the men and women of the Fleet Air Arm had played their part in proving that not only is naval aviation essential in any military conflict, it is the primary weapon of any modern fleet.

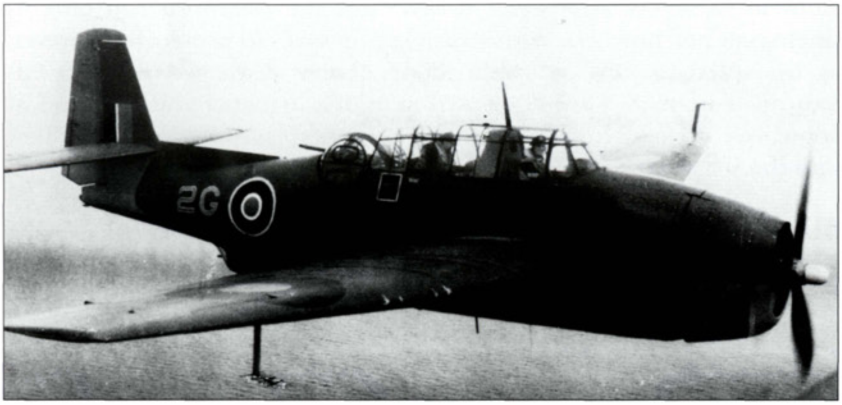
TACTICS

Torpedo-bombers

Delivering a successful torpedo strike against a moving vessel was a difficult skill to master, even without taking into consideration the distractions of enemy fire.

Flights of torpedo-armed aircraft would patrol at altitudes of several thousand feet so as to increase the range at which they could spot their targets; only once the attack was commenced would they dive down to near sea level. The height at which a torpedo was dropped depended on the aircraft type but was invariably below 100 feet – Swordfish pilots aimed to drop their 'fish' from between 50 and 70 feet. This was calculated so the torpedo would enter the water at an angle of between 14 and 24 degrees; if it was outside these parameters it could dive too steeply, bounce back off the surface of the water, or even somersault.

Swordfish and Albacores were fitted with a bar torpedo sight – a metal bar with a row of lamps in front of the windscreen, spaced so that



Nearly 1,000 Grumman TBM Avengers served with the Fleet Air Arm during the war. Although designed as a torpedo-bomber it was operated in many roles, including anti-submarine warfare, mine-laying and bombing strikes. Its 22in torpedo gave it considerably more punch than the Swordfish and Albacore. This aircraft, '2G' from 852 NAS, was flown by S/Lt Peter Westover, with S/Lt W.A. Reeks as observer and L/A 'Taffy' Rees as TAG, at the time of the squadron's formation at US Naval Air Station Squantum, Massachusetts.

they would indicate a succession of 4-degree angles. Once the pilot had selected his best estimation for his target's speed, a lamp would illuminate on the bar; and when the ship's bow was lined up with this lamp, the pilot would release his torpedo. Ideally, the pilot would attempt to line himself up at 60 degrees from the bows of his target. A solitary torpedo running for 2,000 yards, or in extreme cases 4,000 yards, at a speed of up to 40 knots would not be too difficult for a ship to evade; so flights of torpedo aircraft would attack simultaneously, combining three aircraft in formation to drop torpedoes to run parallel to each other. Ships could attempt to evade these by turning and steaming straight toward them, endeavouring to pick their way between the tracks. A counter-tactic against this was to attempt to attack the ship from different sides simultaneously, but this was complex and difficult to co-ordinate. Needless to add, the need to fly straight and level during the attack made the aircraft very vulnerable to enemy fire.

The British 18in torpedo was fitted with an 'air tail' to give stability while it dropped from the aircraft; this would detach once the torpedo hit the water, and it would plunge to its best operating depth, nominally around 40 feet. The torpedo would then decelerate to its pre-selected water speed, and its firing pistol would arm after it had travelled its 'arming range'. The arming range, added to the length of time in the air, would give the torpedo's 'minimum dropping range', below which it would fail to arm in time.

Once the torpedo was dropped the pilot's priority was putting as much distance as he could, as quickly as he could, between his aircraft and the enemy. If he turned away from the enemy ship he would not only slow his aircraft but present a larger profile to AA gunners. For this reason some pilots elected to continue to fly straight over the top of their target, to minimize the time the gunners had to fire at them; but other pilots argued that this presented a no-deflection shot, and that turning made their aircraft a more difficult target.

Countering any enemy fighter aircraft present was much more of a challenge, and torpedo-bombers were extremely vulnerable if left unescorted. Swordfish crews could, to some extent, rely on their aircraft's slow stalling speed, which meant that approaching enemy fighters of more modern design would have only the briefest time to fire on them before they overshot and had to fly around to line up for another pass. Some enemy fighter pilots approached Swordfish with their flaps and landing gear lowered, to reduce their stall speed and allow for a slower approach. In this case, the Swordfish had only its single rear machine gun and evasive manoeuvres to protect it. However, as one-sided as this sounds, Charles Lamb managed to pilot his Swordfish in such a way that two attacking Italian fighter pilots lost control of their aircraft while trying to line up on him, and both flew into the sea.

Dive-bombers

The idea behind the dive-bomber was to place a small number of bombs on to a target with pinpoint accuracy rather than saturating an entire target area with a large payload. The small but potent dive-bomber was an asset that could easily be operated from an aircraft carrier, whereas conventional level bombers required the longer runways of land bases.

Dive-bombers would approach their targets from an altitude of some 15,000 feet to give good target visibility, although factors such as cloud cover might force them to begin their approach from much lower. Major R.T. Partridge RM recalled commencing the attack on the *Konigsberg* from 8,000 feet, and the Trondheim raid on *Scharnhorst* and *Gneisenau* from even lower than 6,000 feet. The flight of dive-bombers formatted in line astern so as to follow one after another in the dive on the target. Before commencing the dive the pilot would idle the engine throttle and extend the bomber's dive brakes; these slowed the speed during the dive, reducing the airflow over the aircraft's surfaces and keeping it controllable. If the target was a moving ship, the pilot would aim to approach from astern so that the target was not closing. Fleet Air Arm dive-bombers carried out their dives at an angle of 65 degrees – a middleground between the steeper German and American dives and the shallower Japanese doctrine. The pilot released his bombs between 2,000 and 1,500 feet, since any lower would mean risking being damaged by their explosion. The dive-bomber would then either climb sharply away from the target, or roll to one side and level off at low altitude, depending on whether the main threat was from AA fire or enemy fighters. In terms of self-defence the dive-bomber proved to be just as vulnerable as the torpedo-bomber – even the Fairey Barracuda was armed with only two machine guns in the rear cockpit, while the Blackburn Skua, although technically a fighter/dive-bomber, was at a severe disadvantage against any modern fighter.

Fighters

At the beginning of the war the fighter squadrons of the Fleet Air Arm were perhaps the least valued and most misused asset of the entire Air Branch. In the eyes of the Admiralty, strike aircraft could, at best, keep enemy shipping distracted while the big-gun battleships of the fleet manoeuvred into position for a proper sea battle; fighter aircraft, however, were only fit for intercepting enemy bombers, and the Admiralty was sure that any enemy raids could be completely neutralized by effective AA fire from warships. This mentality led to HMS *Repulse* and *Prince of Wales* being left without any fighter cover when they sailed for Singapore in December 1941, only to be sunk by an

A 'vic' of Sea Gladiators are visible behind this 801 NAS Skua photographed in 1939. Although a very accurate dive-bomber, the Blackburn Skua was limited by its small payload of a single 500lb bomb. After being replaced in the fighter and dive-bomber roles the Skua continued to serve throughout the war as a target-tug for air-to-air gunnery training.

The clipped-wing variant of the Seafire LIIc had an increased roll rate to counter the German Fw 190A which it met over Normandy, and was also some 5mph faster than Seafires equipped with the conventional wing. It was, however limited to a ceiling of 20,000 feet, sacrificed much of its rate of climb, and was tiring to fly, being heavy on the controls. The decision on which wing variant to operate lay with individual squadron COs.

unopposed force of Japanese aircraft; the battleships' notional air cover was supposed to be provided by RAF fighters that were based too far away to respond in time.

Fighter tactics in the FAA tended to mirror those of the RAF: in the early days of the war fighter pilots were trained in close formation flying, the idea being that a section of three aircraft could be manoeuvred around the sky as one, to bring the sum of all of their forward-firing weapons on to one target or enemy formation. The RAF learned how ineffective this was during the Battle of France and the Battle of Britain, facing Luftwaffe pilots who had learnt during the Spanish Civil War that looser formations and more flexible tactics were required for modern air-to-air combat. Naval veterans of the Battle of Britain then took their experience back to the Fleet Air Arm. One of the biggest changes in tactics was the move from a section of three aircraft in a tight 'vic' formation to a loose formation of four in 'finger four' – resembling the positions of the fingertips of an outstretched hand. The four aircraft could easily split into two pairs, with the leader of each pair free to manoeuvre in the knowledge that his wingman would be covering him from attack.

Unfortunately, in the early years of the war the FAA was equipped with too many two-seat types of very marginal performance, which put them at a considerable disadvantage against the Bf 109 until the Sea Hurricane and Seafire became available in numbers. That said, the technological development of the naval fighter advanced hand in hand with experience in fighter tactics. Land-based interceptors needed to be able to combat medium or heavy land-based bombers and their escorts at high altitude, often up to about 30,000 feet. Naval fighters would more commonly be engaging dive-bombers or torpedo-bombers, both of which operated at medium and low altitudes where the air was much denser. For this reason Seafire LIIIs had the impellers of their superchargers cropped to give better low-altitude performance. During the Normandy landings Seafires also had their wingtips clipped, to increase their rate of roll at low altitude while sacrificing their rate of climb, the latter being considered of secondary importance.

In very general terms the naval fighter pilot was faced with two distinct categories of aerial combat tactics. Dog-fighting involved engaging enemy aircraft in tight turns in an attempt to gain a firing position on the opponent's tail – the more manoeuvrable aircraft with the smaller turning circle would be at a huge advantage, something which the Seafire could exploit against almost any foe. Heavier, more powerful fighters such as the Corsair would be ill-advised to close with an agile enemy fighter; instead, a Corsair pilot could use his superior power to climb away from an enemy fighter before repositioning to dive back down again on his adversary, bringing his heavy firepower to bear before climbing away to reposition again, and never being drawn into a tight turning-match. A powerful and manoeuvrable fighter like the

Seafire made both of these options available to the pilot; but in a slow, underpowered and sluggish type such as the Skua he could only rely on his own skill to counterbalance the inadequacies of his machine, and few pilots committed to combat in such types lived long enough to acquire the necessary experience.

SOURCES & SELECT BIBLIOGRAPHY

For more information on the Fleet Air Arm during World War II, or indeed any aspect of British naval aviation, the Fleet Air Arm Museum is an essential source. Located at RNAS Yeovilton in Somerset, it houses the largest collection of naval aircraft in Europe, and has extensive archives which are open to individuals by prior appointment for academic, publication or family history research.

Also based at RNAS Yeovilton is the Royal Navy Historic Flight, whose collection of airworthy vintage aircraft makes regular appearances at air shows throughout the annual display season. At the time of writing the RNHF operates two aircraft of World War II vintage – a Mk I and a Mk II Fairey Swordfish. Also of note is the Shuttleworth Collection in Bedfordshire, which operates the only airworthy Hawker Sea Hurricane Ib in the world. Duxford's Fighter Collection, the largest collection of airworthy World War II aircraft in Europe, operates a Grumman FM2 Wildcat (Martlet) in Fleet Air Arm colours.

Among publications dealing with the subject in more depth than is possible in a volume of this size, the following are highly recommended:

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PLATE COMMENTARIES

A: UNIFORMS, EUROPEAN THEATRE:

A1: Squadron CO, 1942

The normal working uniform for daily duties was the No.5 Dress, consisting of a double-breasted navy-blue jacket and trousers worn with a white shirt, black tie and patent leather shoes. The material of the jacket and trousers varied, depending on how much the officer was willing to pay to be outfitted; materials such as 'moleskin' were sometimes used, although once the war began these were much harder to acquire. The cap cover is of matching colour to the uniform – a white cover would replace this in hotter climates or between 1 May and 30 September each year. This lieutenant commander wears a gold 'A' inside the executive curl of his uppermost sleeve rank stripe, denoting that he is of 'Air' branch. (Some officers of the Executive Branch joked that this was the only badge ever used by the Royal Navy to show that an individual was *not* qualified to carry out a duty, as Air Branch officers were not trained in bridge watchkeeping.) The qualified naval pilot's 'wings' were displayed above the ranking on the left jacket cuff only.

A2: Telegraphist Air Gunner, 1943

This TAG wears No.3 Dress with red insignia, the rig worn for daily duties. For junior ratings either 5 or 7 creases were ironed into the legs of the bell-bottom trousers, depending on the sailor's height; this was said to represent the five oceans or the seven seas. This TAG wears his leading hand badge on his left sleeve – a fouled killick anchor, which gave rise to the slang name of 'killicks' for leading hands. Two good conduct stripes are worn beneath the anchor, awarded for eight years' good service (or 'undetected crime'). In the case of some misdemeanours these badges could be stripped in lieu of another punishment. The Telegraphist Air Gunner speciality badge is worn on the right sleeve, with one star above the aircraft silhouette to denote TAG 2nd Class. He also wears his TAG badge, or 'wings', on his left cuff **(inset)** – these were only introduced in the autumn of 1942. A blue cap is again worn; the alternative white cover was governed by the same regulation as for officers. The ribbon 'tally' reads 'HMS' only, in contrast to peacetime ribbons which named the rating's ship or shore station.

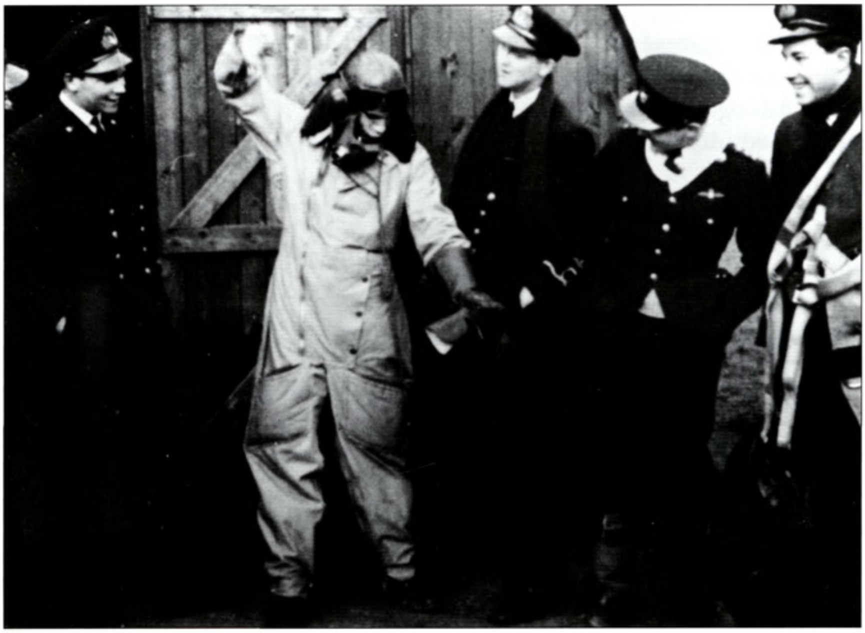
A3: Petty Officer Air Mechanic, 1944

Wearing his daily working rig of No.3 Dress cap and jacket with working overalls, this air mechanic has his PO's badge of crowned crossed anchors on his left sleeve, with 13 years' good conduct stripes beneath it. On his right sleeve is his speciality insignia: the twin-bladed propeller of an air mechanic between the crown identifying him as a senior rating, and the 'A' showing his speciality as airframe mechanic. This PO wears the single-breasted 'economy' style jacket introduced from 1943, with ribbons for the Long Service & Good Conduct and the King George VI Coronation medals; his cap displays the petty officer's crowned anchor badge.

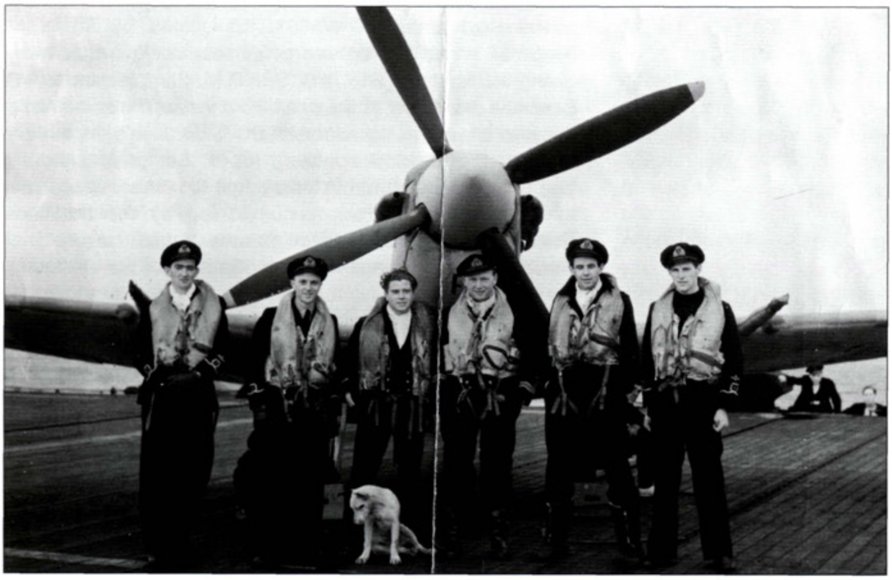
B: AIRCREW FLIGHT CLOTHING

B1: Observer, 1940

Standard flying kit is simply worn over the top of the No.5 Dress daily working rig. This 1938 pattern Irvin flying jacket was not initially an issue item for Royal Navy aircrew and had to be 'scrounged' from RAF stores. It was not favoured by some aircrew, who believed it would become waterlogged and dangerously impede a safe exit from an aircraft after ditching, but many crews of open-cockpit types such as the Swordfish saw this as the lesser of two evils. A 1932 pattern 'Mae West' life jacket, 1933 pattern flying gloves, and a Type B flying helmet with Mk IIIA goggles are also worn. Attached to the helmet earpieces are the connectors for Gosport



In this early war group the 'line-shooting' pilot wears a 1930 pattern Sidcot suit, a development of World War I flying clothing intended for use in open-cockpit aircraft flying at altitude. The pilot second from the right is a Royal Marine captain, who wears 1936 pattern flying boots over his daily working uniform; note his 'wings' badge worn on the left breast of his four-pocket tunic in RM fashion, and the rank 'pips' on his shoulder straps.



Pilots of 808 NAS aboard the escort carrier HMS *Battler*. These Seafire pilots wear 'Mae Wests' and flying boots over their No.5 Dress, with the exception of the officer second from the right, who wears a No.5A battledress blouse (see Plates A1 & B3).

tubes – the intercom device used in multi-seat aircraft not fitted with intercom radio, such as the Swordfish and Skua. (The observer's left cuff badge – **inset** – was not introduced until 1942.)

B2: Telegraphist Air Gunner, 1942

This TAG's 1942 Irvin flying jacket differs from earlier patterns in having seams around the upper sleeves; it was now more cheaply manufactured from larger numbers of smaller pieces of sheepskin. His Irvin flying trousers have integral knee pockets, although this TAG has strapped an extra pad to his left thigh to store notes and maps, readily accessible when he is strapped into his seat. The flying boots are 1941 pattern. He carries a Vickers Gas Operated (VGO) machine gun, the rear-cockpit weapon for the Swordfish, and a drum of .303in ammunition in his left hand.

B3: Pilot, 1942

This RNVR lieutenant, recognizable by his 'wavy navy' epaulette slides, wears a battledress blouse. The BD blouse was not initially issued by the Royal Navy, but FAA aircrews adopted the trend from the RAF, who found it a far more practical flying uniform than their four-pocket tunic. Before it became an issue item (Working Dress No.5A) later in the war, FAA aircrew were forced to buy or scrounge an Army or RAF blouse and have it dyed navy-blue. Over his left breast pocket he wears naval pilot's wings – transposed, on the blouse, from the normal position above the left jacket cuff – and the ribbon of the Distinguished Flying Cross. A silk cravat in place of a tie and closed shirt collar prevented chafing, since fighter pilots were constantly swivelling their heads to search the skies for enemy aircraft. This pilot has also acquired a pair of RAF-issue 'escape boots', which had suede legs detachable from the ankle up, so that if forced down in enemy territory they could quickly be converted to appear as civilian shoes. He carries a 1941 pattern 'Mae West', and a Type C helmet with Type D oxygen mask and Mk IIIA goggles. His slightly battered cap shows evidence of many hours spent stored under the seat of his aircraft, and his general appearance is typical of the casual attitude of which RNVR pilots were proud.

C: TRAINING & DECK RIG

C1: Student pilot, UK, 1943

As this trainee RNVR pilot has not yet been commissioned, he wears the 'square rig' of a junior rating. However, as with officer candidates or 'upper yardsmen' in any branch of the Royal Navy, his cap tally is coloured white to indicate his status as a prospective officer. Likewise, a single white stripe has replaced the three narrow white stripes which border the blue neckerchief/collar of a regular junior rating's rig.

C2: WRNS Air Mechanic, UK, 1944

This Wren wears the 1942 soft-top female cap, and mechanic's blue overalls over her dark blue working shirt and black tie, but has not yet qualified to wear any sleeve badges since she is still in training. As her overalls are male issue, she also wears a rating's blue webbing 'money belt' to cinch in the oversized waist. Her rig, in stark contrast to that of a frontline aircraft maintainer, is clean and conscientiously ironed. She is carrying a smoke float, ready to be fitted to the underwing hard point of a Swordfish.

C3: Aircraft handler, northern waters, 1944

This junior rating wears a blue jersey over blue denim bib-front overalls. A towel was often used as an improvised scarf – aircraft handlers had to work all hours in all weather conditions on the pitching, exposed decks of aircraft carriers, so protection from the elements was vital. His high-visibility fabric helmet is coloured red to identify him as a port watch aircraft handler; blue helmets denoted starboard watch, although this was changed to green during 1944. White helmets were worn by servicing, refuelling and re-arming parties, and yellow – sometimes with yellow over-vests and/or over-sleeves – by aircraft direction personnel.

C4: Flight deck rating, Mediterranean, 1942

This junior rating has adopted a non-regulation but practical and tolerated working rig for a hot climate: a white singlet, white shorts, PT issue plimsolls and socks rolled down. Note that he has also removed his identity discs from around his neck, since these were a snagging hazard when working on aircraft. He has obtained the traditional permission to cease shaving and grow 'a full set', which had to be neatly trimmed.

D: THE CHANNEL DASH, 12 FEBRUARY 1942

The first wave of three Swordfish from 825 NAS, led by LtCdr Eugene Esmonde, DSO, ran in to attack the German heavy cruiser *Prinz Eugen* through both AA fire from the three capital ships and their destroyer and E-boat escorts, and walls of water thrown up by shells from the battlecruisers' main guns. Opposed only by ten Spitfires, a force of several *Staffeln* of Bf 109Fs and Fw 190As swarmed down on the British aircraft. All three of Esmonde's flight had been damaged by Bf 109s of JG 2 before even beginning their attack run. During their attack Ltn Egon Mayer of III/JG 2 ran along the line of Swordfish, damaging them all again with cannon and machine-gun fire; he lowered the undercarriage and flaps of his Fw 190A-2 in an attempt to reduce its stalling speed to avoid overshooting the slow-moving biplanes. When the tail of Esmonde's Swordfish (W5984, 'H') was set alight his TAG, L/A W.J. Clinton, crawled along the fuselage to beat out the flames with his hands. Mayer's second pass killed all three crew of Esmonde's aircraft, but not before he released his torpedo; this succeeded only in forcing the *Prinz Eugen* to take evasive action.

The second and third Swordfish of the flight were also shot down by Mayer and his wingman, Fw Willi Stratmann. In W5983, 'G', the TAG, L/A A.L. Johnson, was killed by Mayer's first pass. The observer, S/Lt E.F. Lee, could not move Johnson's body and reach the Swordfish's rear gun; he stood up in his cockpit to get a better view of the approaching German fighters and shout directions for evasive action to his pilot, S/Lt B.W. Rose. Rose had also been painfully wounded in the spine by the first attack, but managed to keep control of his aircraft long enough to release his torpedo, before clearing the *Prinz Eugen* by a matter of feet and ditching on the far side. Lee managed to drag Rose into their dinghy, and after two hours they were rescued by a British MTB.

The third aircraft – W5907, 'L', piloted by S/Lt C.M. Kingsmill – had the bottom of its rear cockpit shot away, giving the observer and TAG, S/Lt R.M. Samples and L/A D. Bunce, a clear view of the sea below them. The same hail of fire also blew two cylinders off the Swordfish's engine and severed the Gosport speaking tubes. Samples, without a gun to return fire, stood in his cockpit to scream obscenities at the German fighters, accompanied by the traditional British two-fingered salute. Another burst of fire then wounded both Kingsmill and Samples, but Kingsmill managed to release his torpedo on target and then drag the battered Swordfish back around, only to be hit again by fire from E-boats. To make matters worse, the Swordfish's signal stowage was then hit and the emergency pyrotechnics detonated, sending red flares out in every direction; one of these set fire to the dinghy stowage. The aircraft ditched shortly afterwards, and its three crew were rescued by a British warship. Only five of the nine aircrew of the leading flight survived the attack; little is known of the actions of the second flight, as all three Swordfish were shot down and no survivors were ever found.

E: OPERATION 'PEDESTAL', 12 AUGUST 1942

This was the codename for the largest of the convoys to set sail for Malta during the entire war. The Axis high command were in no doubt of the strategic importance of Malta, and hit the convoy with every asset they had available. The carrier HMS *Indomitable*'s fighters consisted of 800 NAS, led by LtCdr J.M. 'Bill' Bruen, and 880 NAS under the command of

Squadron photo of 815 NAS officers, February 1942. Operating Swordfish from Maaten Bagush in Egypt, they wear a motley selection of rigs – mainly Army-issue khaki battledress and khaki drill clothing.

LtCdr F.E.C. 'Butch' Judd; both squadrons operated the Sea Hurricane Ib. The fiercest combats took place on 12 August, when enemy raids of more than 100 aircraft attacked the convoy. Bruen's section attacked a formation of Junkers Ju 88s shortly after 9.00am; the Irish squadron commander, flying Z4550 'G', shot down one and damaged a second. Bruen later shared the destruction of an S 84 torpedo bomber with S/Lt Andy Thompson (P2506, 'J'), before claiming a third aircraft later in the day – an SM 79 torpedo bomber shot down into the sea from low altitude; these were his fifth to seventh confirmed kills. 880 NAS was also involved in the thick of the fighting – its Senior Pilot, Lt R.J. 'Dickie' Cork, led Blue Section against the morning's first raid, personally shooting down two Ju 88s to add to his five Battle of Britain victories and the German bomber he had shot down (unconfirmed) the previous day. His next sortie added a third Ju 88 and a Messerschmitt Bf 110 to his tally; however, LtCdr Judd was shot down and killed as he approached a Heinkel He 111 bomber, leaving Cork to lead the squadron. Cork also shot down another Bf 110 and an SM 79 before the end of the day, giving him five confirmed kills in 24 hours – a feat unrivalled by any other FAA pilot during the war, which earned him the DSO. (Cork's aircraft that day, believed to have been marked 'L', was subsequently tipped overboard due to excessive damage.)

F: UNIFORMS, BRITISH PACIFIC FLEET, 1945

F1: Observer

This RNVR lieutenant wears khaki Tropical Working Dress of aertex shirt and drill shorts, made in India and issued whilst en route to the Pacific. Shirt sleeves were either long and rolled up or cut down, and long khaki trousers were also an acceptable alternative to shorts. His cap has a khaki cover; with this rig some officers alternatively wore navy-blue berets pulled right, complete with the embroidered officer's badge over the left eye. Other than khaki slip-on epaulette slides bearing ranking in a darker shade of khaki, no insignia are worn with this uniform.

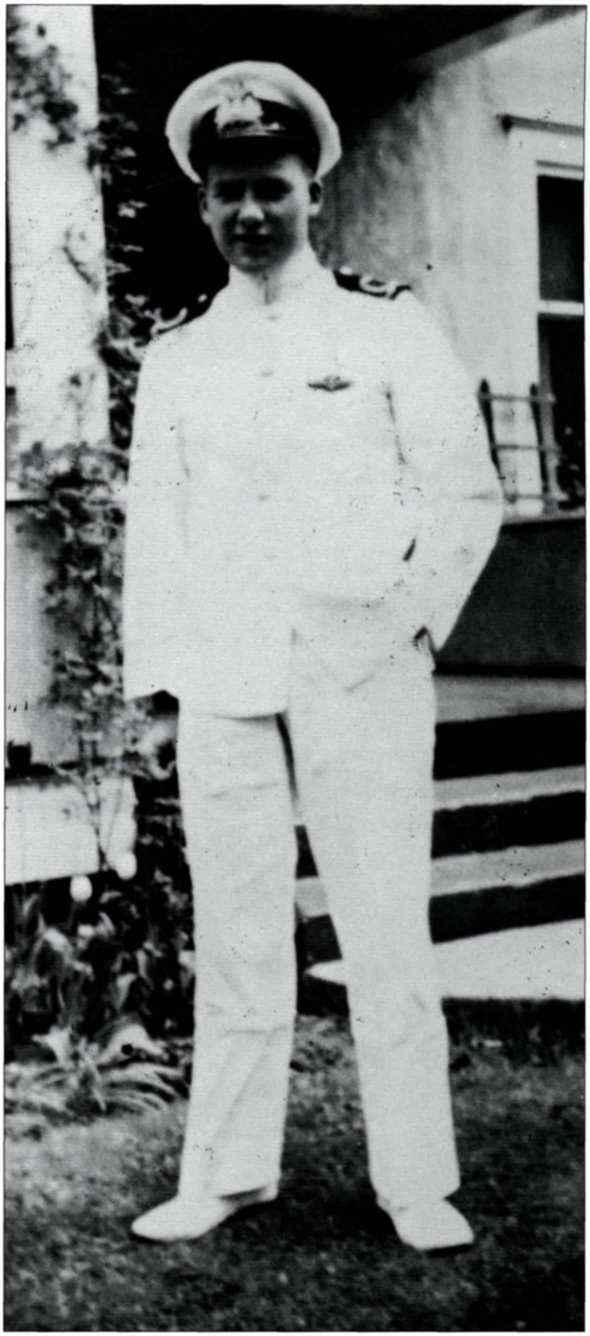
F2: Pilot

Fleet Air Arm aircrew trained by the US Navy were issued with American flying kit, which was far better suited to operating in the conditions encountered in the Pacific. This pilot wears US Navy lightweight nylon flying overalls, complete with the USN pilot's wings-and-name patch **(inset)** – USN wings were awarded on completion of training in the United States. Some pilots who trained in England and did not have immediate access to US kit simply purchased civilian lightweight overalls and sewed extra pockets to them for flying; the tailors Gieves & Hawkes even supplied flying suits to their clients' specification. This pilot also has a privately acquired survival knife stitched to his ankle.

Although US flying helmets and goggles are seen in some photos, this pilot's remaining kit is standard British issue: a lightweight khaki fabric Type E flying helmet with accompanying Type E oxygen mask, and a 1941 pattern 'Mae West'.

F3: Squadron CO

This lieutenant commander wears the white No.13 Tropical Dress, consisting of an open-collar, short-sleeved white shirt and matching drill material shorts. Rank is displayed on detachable boards fitted to the shoulders. Note also the lack of pilot or observer wings, which were not worn on No.13 Dress.



S/Lt R.H. Gray, then with 789 NAS, photographed in Africa in 1942 wearing White Undress – No.10 Dress – with pilot's wings above the left breast pocket. While Senior Pilot of 1841 NAS with the British Pacific Fleet, Lt Gray was leading an attack on a Japanese destroyer on 9 August 1945 when his Corsair was severely damaged and set ablaze. Although wounded he remained at the controls and delivered his bomb, sinking the destroyer; his aircraft then crashed into the sea. 'Hammy' Gray was the last Canadian to be killed in action during the war, and received the Fleet Air Arm's second posthumous Victoria Cross.

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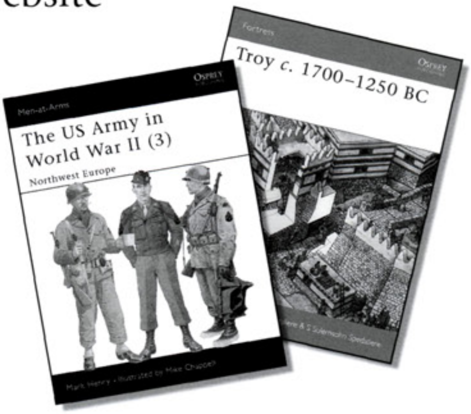

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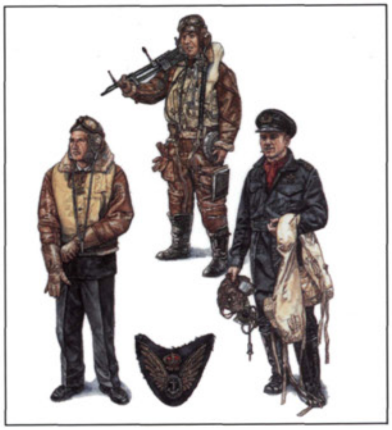

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